

14131630R

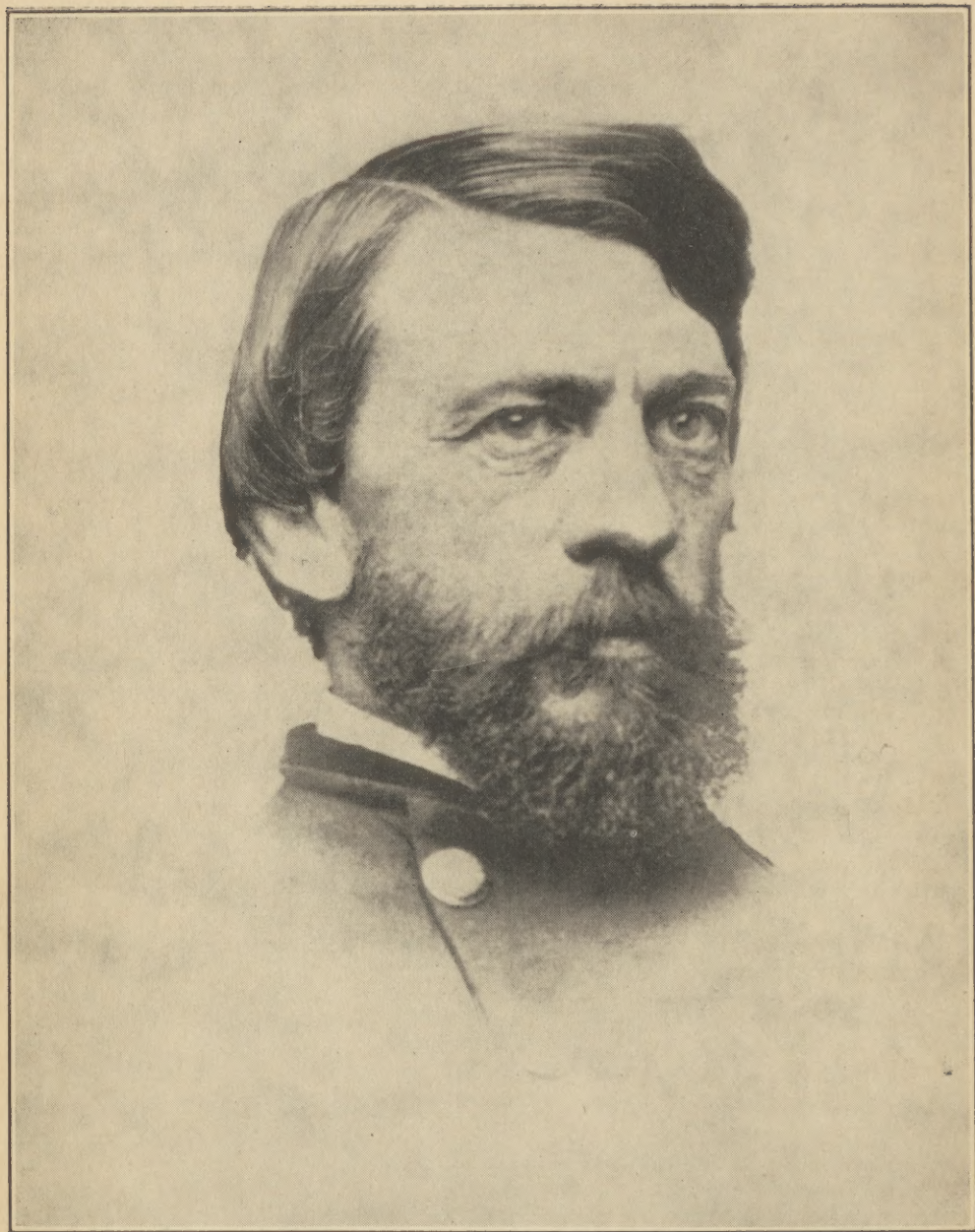


NLM 05100075 3

NATIONAL LIBRARY OF MEDICINE







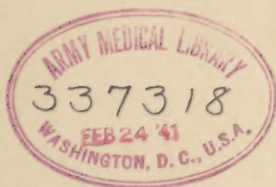
(Courtesy of U. S. Army Medical Museum)

SURGEON JOHNATHAN LETTERMAN (1824-1872)

The Medical Officer who devised the plan of field hospitalization and evacuation which has influenced that service in every modern army.

MILITARY ^{///} MEDICAL MANUAL

4th Edition



THE MILITARY SERVICE PUBLISHING COMPANY
HARRISBURG, PENNSYLVANIA

[1940]

Copyright, 1940, By
THE MILITARY SERVICE PUBLISHING Co.
Harrisburg, Pa.
Fourth Edition (Revised), December, 1940

UH
390
M644
1940a

ALL RIGHTS RESERVED

KNOWLEDGE IS
POWER



THE MILITARY SERVICE PUBLISHING Co.
100 TELEGRAPH BUILDING
HARRISBURG, PA.

THE TELEGRAPH PRESS
Harrisburg, Pa.

PRINTED IN THE U. S. A.

FOREWORD

BY MAJOR GENERAL JAMES C. MAGEE

THE SURGEON GENERAL, U. S. ARMY

Earlier editions of this book have been a great help to medical officers, particularly those of the National Guard and Reserve forces.

The present issue has been modified, where necessary, to meet the requirements of current practice and may be accepted as a practical and reliable text concerning military medical matters.

PUBLISHER'S PREFACE

The purpose of this book is to present information of practical value to officers of the Medical Department of the Army of the United States. The sources of the subject matter are official publications of the War Department and instructional material published by the general and special service schools. However, no person is to conclude, because of the use of these sources, that this volume is in any sense "Official." It is divided into the three divisions with which the medical officer must concern himself in the full sweep of his responsibilities.

Part I contains military matters of which the medical officer should have knowledge; it is presented with special consideration of his requirements. Part II contains professional subjects peculiar to the responsibilities of the medical officer. Historical and other interesting data about the Medical Department are included. Part III contains complete and detailed information about the tactical employment of medical units in the field and includes the subjects of administration, supply, and mess management, with special reference to the problems of small units.

An extensive index of the entire volume is included to simplify reference to this fund of knowledge.

Grateful acknowledgment is made to the considerable number of officers whose work in preparation, editing, and review has made possible the production of this manual.

THE PUBLISHERS

MILITARY MEDICAL MANUAL

Table of Contents

PART I

MILITARY SUBJECTS

<i>Chapter</i>	<i>Page</i>
I. THE ARMY OF THE UNITED STATES	1
II. BACKGROUND FOR MOBILIZATION PLANNING	21
III. TACTICAL FUNCTIONS OF THE ARMS	37
IV. ORGANIZATION OF LARGE UNITS	93
V. TACTICAL EMPLOYMENT OF THE COMBINED ARMS	103
VI. COMMAND AND STAFF PROCEDURE	147
VII. SUPPLY AND EVACUATION OF LARGE UNITS	165
VIII. LEADERSHIP	175
IX. DEFENSE AGAINST CHEMICAL WARFARE	181
X. MAP READING	201
XI. INTERPRETATION OF AERIAL PHOTOGRAPHS	245
XII. CARE AND OPERATION OF MOTOR VEHICLES	263
XIII. MILITARY COURTESY	299
XIV. CUSTOMS OF THE SERVICE	309
XV. BALLISTICS AND PROJECTILES	321

PART II

MEDICAL SUBJECTS

I. MEDICO-MILITARY HISTORY	331
II. ORGANIZATION AND ACTIVITIES OF THE MEDICAL DEPARTMENT	371
III. FIELD SANITATION	391
IV. ESSENTIALS OF MILITARY PREVENTIVE MEDICINE	429
V. MILITARY HYGIENE	447
VI. FIRST AID	463
VII. AVIATION MEDICINE	509
VIII. MEDICAL ASPECTS OF CHEMICAL WARFARE	521

PART III

MEDICAL TACTICS AND ADMINISTRATION

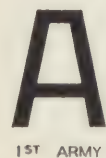
I. ATTACHED MEDICAL PERSONNEL WITH UNITS OF THE INFANTRY AND CAVALRY DIVISIONS	537
II. THE MEDICAL REGIMENT, THE MEDICAL SQUADRON, AND THE MEDICAL BATTALION	581
III. THE MEDICAL SERVICE WITHIN THE DIVISION	613
IV. THE MEDICAL SERVICE WITHIN THE CORPS AND FIELD ARMY	669
V. THE MEDICAL SERVICE OF A FIELD FORCE	689
VI. TRAINING OF MEDICAL UNITS	741
VII. COMBAT ORDERS AND THE SOLUTION OF MEDICAL PROBLEMS	777
VIII. ADMINISTRATION	801
IX. MESS MANAGEMENT	839
X. SUPPLY	853
INDEX	865

WORLD WAR — DISTINCTIVE INSIGNIA UNITED STATES ARMY

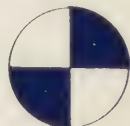
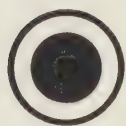
AMERICAN EXPEDITIONARY FORCE



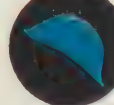
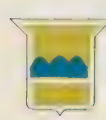
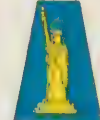
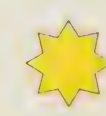
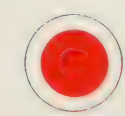
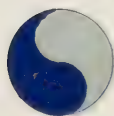
ARMIES



CORPS



DIVISIONS



CHAPTER I

THE ARMY OF THE UNITED STATES

"We shall more certainly preserve peace when it is well understood that we are prepared for war." ANDREW JACKSON.

Morale and Discipline. The Chief of Staff issued a letter on October 16, 1940, of tremendous importance to the United States and to all components of the Army. The letter which is reproduced below states the situation of the gigantic drive for military preparedness, the high objectives to be obtained, the mission of the Army, and presents wise counsel about the methods to be followed. It should be read over and over again by all officers.

WD 324.71(9-3-40)M-A

WAR DEPARTMENT
OFFICE OF THE CHIEF OF STAFF
WASHINGTON

SUBJECT: Morale and Discipline

TO¹:

1. The United States has embarked on an extensive peacetime program of national defense. The President has provided the leadership, and Congress, with the support of the American people, is granting the essential funds. Industry and labor are rapidly mobilizing to produce munitions. The National Guard is taking the field. Recruits are reporting to their regiments in unprecedented numbers, shortly to be joined by large numbers of their fellow citizens chosen under the Selective Service Act. The preliminaries are over. The task now looming before us is the expeditious development of a unified, efficient fighting force of citizen-soldiers.

2. The Army of the United States, keenly aware of its great responsibility, assumes this task as a profound privilege.

3. First in importance will be the development of a high morale and the building of a sound discipline, based on wise leadership and a spirit of mutual cooperation throughout all ranks. Morale, engendered by thoughtful consideration for officers and enlisted men by their commanders, will produce a cheerful and understanding subordination of the individual to the good of the team. This is the essence of the American standard of discipline, and it is a primary responsibility of leaders to develop and maintain such a standard. To this end commanders of all echelons are directed to study and apply the provisions of Mobilization Regulations 1-10, regarding Morale.

4. The adoption of a peacetime Selective Service System presents a special problem for all components of the Army. The men selected for service, together with those now enlisting, are representative of the citizen-soldier who has always defended our nation in the past. These men come from all walks of life, with widely varying degrees of education, intelligence and native ability. They differ in racial characteristics, religion, philosophy, social training, physical development and material wealth. It will tax the skill and wisdom of leaders of all ranks to mold these citizen-soldiers into a unified Army prepared to accept cheerfully the rigors of long hours of training, the fatigue of marches, and the discomforts and hardships of service in the field. The officers and noncommissioned officers who will have charge of these men must be instructed in advance concerning every phase of their reception, equipment, care and instruction, and the execution must be carried out under the alert supervision of higher commanders.

5. In accomplishing the foregoing, there must be no pampering of individuals, no distinctions between men because of their previous military experience or condition of entry into the service. In a spirit of mutual respect and cooperation, the Army of the United States must now proceed with its high purpose of welding from the elements of the American democracy a disciplined, seasoned fighting force capable of defending the nation.

G. C. MARSHALL, *Chief of Staff.*

¹ This letter was distributed widely within the Army of the United States.

The Constitution Relating to the National Defense. Officers of the Army of the United States should be familiar with the provisions of the Constitution. It is essential that they have a thorough understanding of the many items which refer directly to the national defense. The liberties which we enjoy in this nation are too often taken for granted by our citizens, but officers must remember that they were bought with blood. The price we paid for our liberties was not too high. They are set forth and guaranteed in the Constitution. It is significant that the Oath of Office emphasizes protection of the Constitution as the first loyalty. The Constitution requires the Congress to provide for the national defense. The armed forces are merely the instrumentalities of a free people which are created by the Congress for the purposes of insuring the peace and domestic tranquility of the nation.

The Constitution of the United States with its amendments contains complete statements of the purposes and provisions for which the armed forces of the nation are maintained.

The Preamble reads as follows: *We, the people of the United States, in order to form a more perfect union, establish justice, insure domestic tranquility, provide for the common defense, promote the general welfare, and secure the blessings of liberty to ourselves and our posterity, do ordain and establish this Constitution for the United States of America.*

Article I defines the composition, powers, responsibilities, and limitations of the Congress of the United States. Section 8 of this Article gives to the Congress important powers relating to the national defense: (1) *to pay the debts and provide for the common defense and general welfare of the United States;* (2) *to declare war, . . . and make rules concerning capture on land or waters;* (3) *to raise and support armies, but no appropriation for that use shall be for a longer term than two years;* (4) *to provide and maintain a navy;* (5) *to make rules for the government and regulation of the land and naval forces;* (6) *to provide for calling forth the militia to execute the laws of the Union, suppress insurrections and repel invasions;* (7) *to provide for organizing, arming, and disciplining the militia, and for governing such part of them as may be employed in the service of the United States, reserving to the States respectively the appointment of officers, and the authority of training the militia according to the discipline prescribed by Congress.*

The method of appointment of the President with his duties, responsibilities, and restrictions as Chief Executive of the United States are set forth in Article II. Those matters contained therein which have important reference to the national defense are as follows: (1) *The President shall be Commander-in-Chief of the Army and Navy of the United States, and of the militia of the several States when called into the actual service of the United States . . .* (2) *He shall have power, by and with the advice and consent of the Senate, to make treaties . . . ;* (3) *he shall take care that the laws are faithfully executed and shall commission all the officers of the United States.*

The federal government assumes important responsibilities with respect to the protection of the several States. As prescribed in Section 4 of Article IV they are as follows: *The United States shall guarantee to every State in this Union a republican form of government, and shall protect each of them against invasion; and, on application of the Legislature, or of the Executive (when the Legislature cannot be convened), against domestic violence.*

It will be noted that the Constitution prescribes missions, duties, and responsibilities but is quite silent as to the methods by which they are to be accomplished. Hence, enabling Acts passed by the Congress and approved by the President are necessary to provide the means by which the constitutional requirements are to be accomplished. Whereas the Articles of the Constitution relating directly to the national defense have never been amended, the enabling Acts which carry them into execution are subject to rather continuous revision in accordance with national requirements or international conditions. Illustrative of this fact, the strength of the armed forces is subject to annual variation in accordance with funds which are appropriated by the Congress for their support and maintenance.

The National Defense Act. The basic National Defense Act under which the Army is now organized and administered is the Act of June 3, 1916, with its many amendments. The amendment which has had the most far-reaching effect is that of June 4, 1920, which not only expanded the armed forces but incorporated the many lessons learned as a result

of participation in the World War. The system of defense thus constituted is peculiarly American in that it embraces basic principles and beliefs which have long been the bulwark of the nation. For the first time throughout our history a sound military policy is in effect under which the nation may function in peace or war. It provides the means by which our peace may be retained, by warding off the encroachments of foreign powers who, but for our evident strength, might otherwise be tempted to aggression; likewise important, should our peace again become forfeit, the machinery is at hand for restoring it under conditions of their own choice to the very hands of those who may permit it to slip from their grasp. The system works.

This Act created the Army of the United States consisting of the Regular Army, the National Guard, and the Organized Reserves. It established a territorial organization of the United States into nine corps areas, based on population, with troops and administrative agencies for mobilization within each. The training of civilians was provided through the Reserve Officers' Training Corps and Citizens' Military Training Camps. Means were included for the mobilization of industry to meet wartime requirements. Each arm and service was provided with a branch chief to function within the War Department. It established the system of promotion of officers and fixed their numbers. The function of the General Staff was set forth. It made available a thorough system of education for the officers of the Army through the agency of the general and special service schools.

The passage of legislation providing for compulsory military training in time of peace resulted in the registration, on October 16, 1940, of more than 16,000,000 citizens in age groups 21-35, inclusive, from among whom the required number may be chosen for service. This important departure from past peacetime precedent is sufficient proof that the nation is willing to meet the sacrifices incident to an adequate preparedness program.

THE WAR DEPARTMENT

The President. The President is the constitutional commander-in-chief of the Army. Command is exercised through the Secretary of War, a cabinet member, who is charged with carrying out the policies of the President in military matters.

The Secretary of War. The Secretary of War represents the President in exercising his command function, and under the law and decisions of the Supreme Court his acts are the President's acts and his directions and orders are the President's directions and orders.

The Assistant Secretary of War, under the direction of the Secretary of War, is charged with the supervision of the procurement of all military supplies and other business of the War Department pertaining thereto and the assurance of adequate provisions for the mobilization of matériel and industrial organizations essential to wartime needs.

The Assistant Secretary of War (Air) serves as an aid to the Secretary of War in fostering military aeronautics and performs such functions as the Secretary may direct.

The Chief of Staff. The Chief of Staff is the principal officer of the Army. He is selected from among the general officers and is appointed for a period of four years. While so serving he holds the rank of general. He is the immediate adviser of the Secretary of War on all matters relating to the Military Establishment and is charged by the Secretary of War with the planning, development, and execution of the military program. As the agent, and in the name of the Secretary of War, he issues such orders as will insure that the plans of the War Department are harmoniously executed by all agencies under its jurisdiction and that the military program is carried out speedily and efficiently. During peace, by direction of the President, he is the commanding general of the Field Forces and in that capacity directs the field operations and the general training of the several armies, of the overseas forces, and of GHQ units. He continues to exercise command of the field forces after the outbreak of war until such time as the President shall have specifically designated a commanding general thereof.

In the performance of his duties he is assisted by the Deputy Chief of Staff and through him by the War Department General Staff.

The Deputy Chief of Staff. The Deputy Chief of Staff assists the Chief of Staff and acts for him in the War Department in his absence. He reports directly to the Secretary of War in all matters not involving the establishment of important policies.

His office is charged with the preparation of plans and policies in connection with legislation and with military estimates for funds, with processing budgetary matters in the General Staff, with reports concerning legislation and requests that come within the purview of the General Council or that are referred to the General Staff, and with such other duties as the Chief of Staff may prescribe.

In addition to his other duties the Deputy Chief of Staff is charged with supervision over the activities of all the divisions of the War Department General Staff.

The War Department General Staff. The War Department General Staff is charged with the preparation in time of peace of the several plans outlined above for the Deputy Chief of Staff. In a national emergency it is charged with the creation and maintenance of the necessary and proper forces for use in the field.

This agency of the War Department does not engage in administrative duties for the performance of which an agency exists but confines itself to the preparation of plans and policies (particularly those concerning mobilization) and to the supervision of the execution of such plans and policies as may be approved by the Secretary of War.

The several sections into which the War Department General Staff is organized are as follows:

Personnel Division (G-1)

Military Intelligence Division (G-2)

Operations and Training Division (G-3)

Supply Division (G-4)

War Plans Division (WPD)

The chiefs of each of the several divisions are designated as assistant chiefs of staff; the prescribed abbreviation is A. C. of S., followed by the prescribed abbreviation of the division.

The General Council. The General Council was created for the purpose of reviewing and coordinating all major War Department projects and passing on matters of current policy. It functions under the Chief of Staff.

The Deputy Chief of Staff serves as its president. The General Council includes the assistant chiefs of staff and the executive officer of the Assistant Secretary of War. The executive heads of other War Department agencies (for example, branch chiefs) are directed to sit as members during the discussion of any important subject bearing upon their responsibilities, and they are privileged to sit during the discussion of any important subject in which they are interested.

Chiefs of Arms and Services. Each arm and service is represented in the War Department by a branch chief. They are appointed for a period of four years, and while so serving they hold the rank of major general. They are under the supervision of the Chief of Staff in all matters pertaining to their respective branches. They do not exercise command of troops.

There are many specific duties, in addition to advising the Chief of Staff in matters pertaining to their branch, which are delegated to the chief of an arm or service, the following being listed for purposes of illustration: supervision and control over the special service schools of the branch, formulation and development of the tactical doctrine of their branch, development of improved arms and equipment, recommendation of officers to receive military education, annual classification of officers according to efficiency, training inspections.

Some but not all of the branch chiefs are authorized one or more assistants in the grade of brigadier general while so serving; each is provided with a small staff as assistants in the execution of his responsibilities. The Chief of Infantry, for example, has an executive, a personnel section of three officers, a training section of six officers, and an arms, equipment and finance section of two officers. For a discussion of the organization and personnel of the Office of the Surgeon General see Chapter II, Part II, ORGANIZATION AND ACTIVITIES OF THE MEDICAL DEPARTMENT.

Components of the Army of the United States. The Army of the United States comprises the Regular Army, the National Guard while in the service of the United States, and the Organized Reserves, including the Officers' Reserve Corps and the Enlisted Reserve Corps.

A graph showing the strength of the Army is shown in Plate 1 for the period 1920-1940, inclusive, on June 30 of each year.

The Arms and Services. Army troops of each of the three components of the Army of the United States are divided into two general categories, the "arms" and the "services."

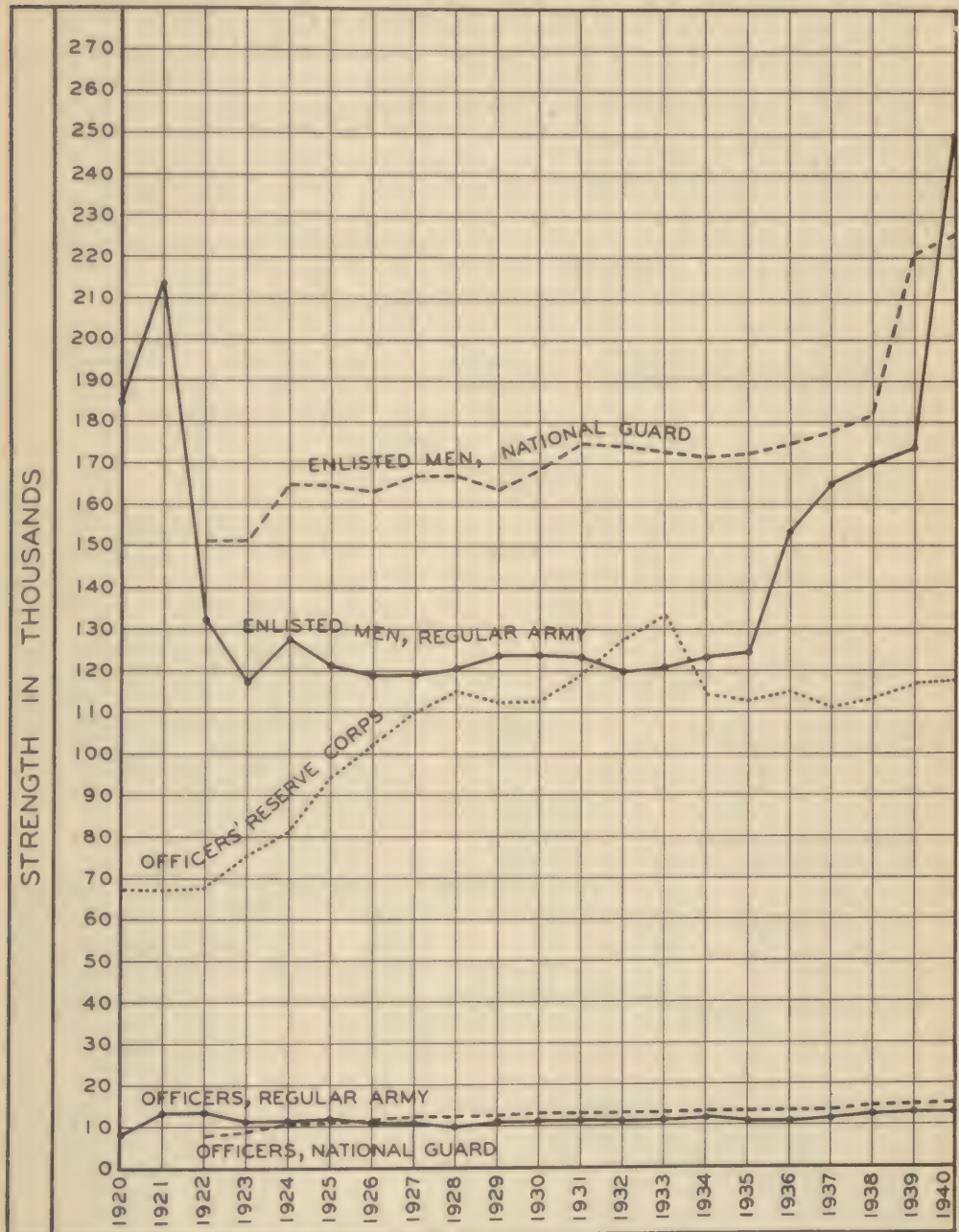


Plate 1. Annual Strength Chart, 1920-1940.

The arms comprise those troops, in general, who do the fighting or whose activities are closely related to combat. The services comprise administrative, technical, and supply troops whose duties are indispensable to the success of a field force but who usually are not called upon to fight.

The arms include the following branches: Infantry, Cavalry, Field Artillery, Coast Artillery Corps, Air Corps, Corps of Engineers, Signal Corps.

The services consist of the Adjutant General's Department, Inspector General's Department, Judge Advocate General's Department, Quartermaster Corps, Finance Department, Medical Department, Ordnance Department, Chemical Warfare Service, and Chaplains.

A discussion of the functions of each arm is presented in Chapter III, Part I.

Units of the Army. A few of the services are composed entirely of officers; the other arms and services consist of both officers and men, organized into units of different sizes running from squads of twelve men or less up to regiments or brigades of several thousand men. Units of the combined arms and services start with the division and include the army corps and the field army. The accompanying table lists the Army units from the smallest to the largest and gives their approximate strength. In general, each unit comprises two or more of the units listed next above. For example, a section or platoon is composed of several squads; a company, troop, or battery is in turn composed of several platoons, and so on down the units listed in the left-hand column of the plate.

UNITS OF THE ARMY

<i>Units</i>	<i>War strength (approximate)</i>	<i>Rank of commander (normal)</i>	<i>Other names for units of similar size</i>	<i>Arms and services composing the unit</i>
Squad	12 or less	Sergeant or corporal.	Found in nearly all arms and services. Composed only of troops from a single arm or service, except that chaplains and medical personnel form part of any regiment of any arm or service.
Section	20-25	Sergeant .....	.....
Platoon	40-55	Second or first lieutenant.	Called "sub-flights" in the Air Corps.	
Company	80-200	Captain	Called "batteries" in the Field and Coast Artillery; "troops" in the Cavalry; "flights" in the Air Corps.	
Battalion	300-850	Lieutenant colonel or major.	Called "squadrons" in the Cavalry and Air Corps.	Found only in the Infantry, Cavalry, Field Artillery, and Coast Artillery. The triangular (streamlined) infantry division contains no brigades.
Regiment	800-3100	Colonel	Called "groups" in the Air Corps.	
Brigade	5000-6300	Brigadier general	Called "wings" in the Air Corps.	
Division (There are two types of infantry divisions—the triangular (streamlined) division and the square division—and one type of cavalry division. In infantry divisions, infantry forms the basic fighting strength,	Triangular (streamlined) infantry division, 12,500; square infantry division, 18,500; cavalry division, 10,000.	Major general	Composed of brigades, regiments, and battalions (cavalry divisions and square infantry division), or of regiments and battalions (triangular infantry division), from many different arms and services.

UNITS OF THE ARMY—Continued

<i>Units</i>	<i>War strength (approximate)</i>	<i>Rank of commander (normal)</i>	<i>Other names for units of similar size</i>	<i>Arms and services composing the unit</i>
and in cavalry divisions the main combat arm is cavalry.)				
Corps (often called "army corps" to distinguish it from arms and services which have the word "corps" as part of their names, such as the Corps of Engineers and the Coast Artillery Corps).	65,000-90,000	Lieutenant general		Composed of infantry divisions of both types or of cavalry divisions, and of additional brigades, regiments, and battalions, from many different arms and services. Contains officers of all arms and services.
Army (often called "field army" to distinguish it from the whole Army of the United States, of which such a unit forms only a part).	200,000-400,000	General		Composed of corps, and of additional units from several arms and services.

Territorial Organization. The United States is divided, on a basis of military population, into nine territorial subdivisions which are called *corps areas*. The following chart shows how each is formed from three or more states. In addition to the corps areas, the overseas possessions of the United States are organized into four departments which function in a manner similar to that prescribed for the corps areas. These departments are: the Philippine Department, the Hawaiian Department, the Panama Canal Department, and the Department of Puerto Rico. Alaska is included in the Ninth Corps Area.

Corps area commanders command all military personnel and establishments which are within the territorial limitations of their organizations, except for certain stations and personnel, such as special service schools, which are specifically exempted. This responsibility now includes administrative control of the Civilian Conservation Corps. Their specific duties include responsibility for training and supervision of training activities, particularly those which refer to field training and preparation for war service. The staff of a corps area commander consists of a *personal staff* (authorized aides), a *general staff* (chief of staff, G-1, G-2, G-3, G-4), and an *administrative, supply, and technical staff*.

Corps area commanders are appointed from the list of major generals of the line of the Army.

Field Army Organization. In general, the troops raised for war service in each corps area will constitute a corps of two or more divisions; however, the organization of the corps is flexible and the statement that each corps area will form one corps is not strictly true. In practice they might form two or even more corps or less than a corps. The proposed organization of the war time army, above the corps, is more definite. Present plans call for the grouping of available forces into four field armies constituted as follows:

First Army: First, Second, and Third Corps Areas.

Second Army: Fifth and Sixth Corps Areas.

Third Army: Fourth and Eighth Corps Areas.

Fourth Army: Seventh and Ninth Corps Areas.

The Congress in 1939 passed legislation which was approved by the President authorizing the rank of lieutenant general for officers assigned by the War Department as Army Commanders.

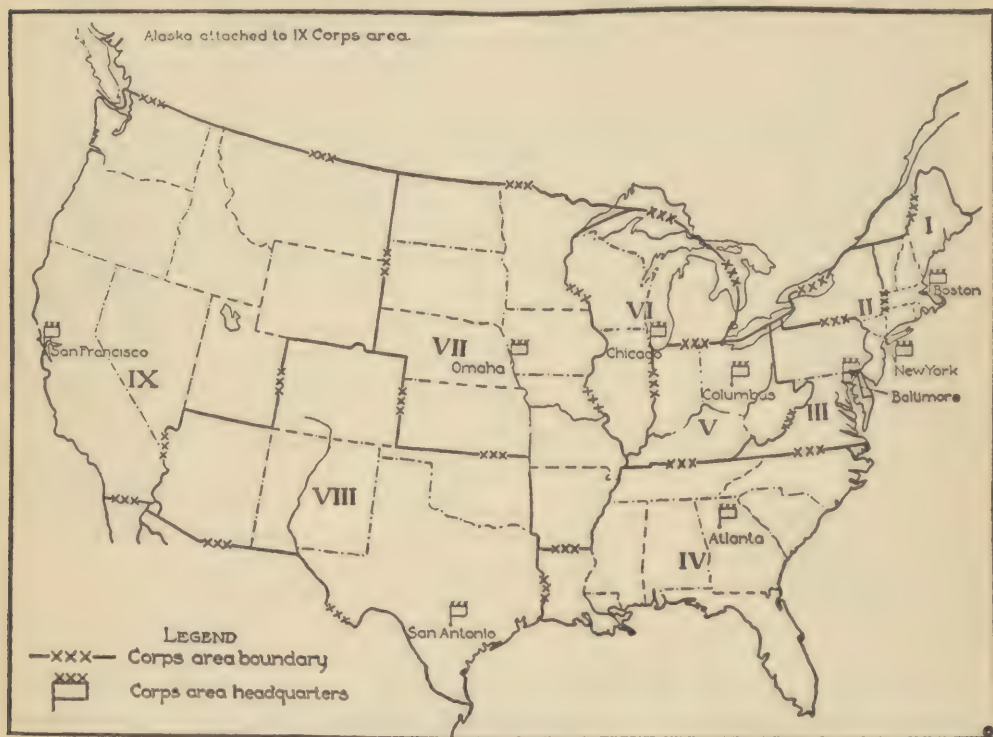


Plate 2. Corps Area Boundaries and Headquarters.

THE REGULAR ARMY

Mission. The Regular Army constitutes the permanent military force and consists of professional officers and soldiers who are voluntarily commissioned or enlisted therein. It is widely scattered through the continental United States and in Hawaii, Alaska, the Panama Canal Zone, Puerto Rico, and the Philippine Islands. A highly trained, well equipped, well disciplined organization, the Regular Army serves as a model and furnishes instructors for the other components of the Army of the United States, the Reserve Officers' Training Corps, and Citizens' Military Training Camps.

Its specific functions are as follows:

- a. To provide garrisons for the continental frontiers of the United States and overseas possessions, small garrisons in a few seacoast defenses, and caretakers for the remainder.
- b. Personnel for the development and training of the National Guard, Organized Reserves, and Reserve Officers' Training Corps and for the conduct of Citizens' Military Training Camps.
- c. An organization for the administration and supply of the peace-time establishments.
- d. A framework for rapid expansion to meet war-time requirements.
- e. A repository of cumulative military knowledge and a laboratory for military developments so as to keep this country up-to-date and prepared.
- f. In conjunction with the National Guard, a covering force in case of a major war.

Regular Army Officers on Duty as Instructors. The table below shows the number of Regular Army officers on duty with the several civilian components as instructors as of October 20, 1939; during the fall of 1940 a large number of these officers were replaced by retired officers or by Reserve Officers.

Summary of Officers on Duty as Instructors

	Colonel	Lt. Colonel	Major	Captain	1st Lieut.	2d Lieut.	Total
National Guard	26	96	254	47	1	0	424
Organized Reserves	90	101	276	57	11	0	535 ¹
R. O. T. C.	47	124	434	187	13	1	806
Totals	163	321	964	291	25	1	1765

¹ Includes those assigned "In addition to other duties."

The Regular Army Reserve. In normal times units of the Regular Army are maintained at a peace strength materially less than the numbers which are required for active operations under war conditions. Turnover of enlisted men, especially in the lower grades, is relatively high. The loss in trained manpower caused by this condition is partially overcome by legislation enacted in 1938 providing for a Regular Army Reserve. This permits enlisted men who have completed their enlistments, whose records are good, and who are within prescribed age limits, to retain a reserve status with a small

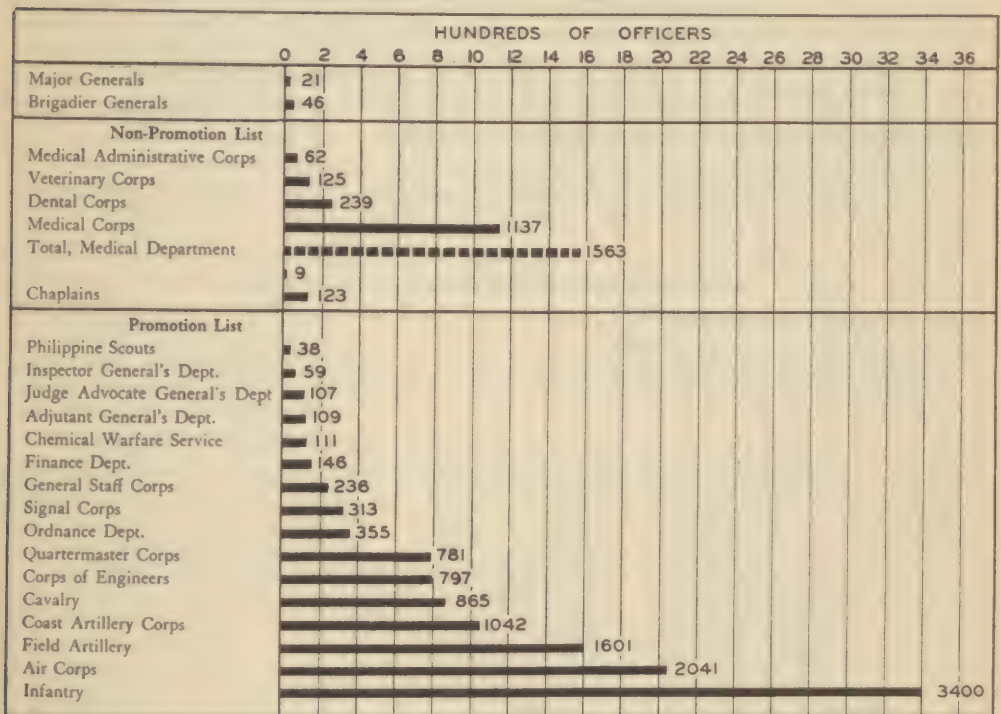


Plate 3. Comparative Strength of the Arms and Services from Army List and Directory, Oct. 20, 1939.

monthly remuneration in return for accepting recall to the colors in time of emergency. This wise legislation simplifies the problem of the Regular Army in expanding quickly and eliminates in large degree the lengthy training phase which would be required to absorb a large number of untrained men.

THE NATIONAL GUARD

Mission. In time of peace, the mission of the National Guard is to provide an adequate, organized, and effective force, sufficiently trained and developed so that it will be available in minor emergencies for employment *within the limits of the United States by the States or*

by the United States, and so that it will be immediately available for employment in the execution of limited missions.

In time of war or major emergencies, when Congress has authorized the use of troops in excess of those of the Regular Army, the mission of the National Guard is to provide an adequate and effective component of the Army of the United States *for employment by the United States without restrictions as to missions or place of employment.*

Definition. The National Guard is legally defined as the "organized militia of the several States, Territories, and the District of Columbia." In contrast to the *organized* militia, the militia of the United States consists of all male citizens of the United States and all other able-bodied males who have or shall have declared their intention to become citizens of the United States, who are more than 18 years of age and not more than 45 years of age, and said militia shall be divided into three classes, the National Guard, the Naval Militia, and the Unorganized Militia. (Sec. 57, National Defense Act.)

In accordance with the dual mission of the National Guard, it has a dual status. *First*, as the National Guard of each State, Territory, and the District of Columbia, it constitutes State troops during times of peace, under the control of the several governors and, under very precise restrictions, under the control of the President of the United States. These units are, however, administered, armed, uniformed, equipped, and trained in accordance with federal law; they are under federal supervision and are paid from federal funds. *Second*, as the National Guard of the United States, it is a reserve component of the Army of the United States, consisting of federally recognized National Guard units and organizations and of the officers, warrant officers, and enlisted members of the National Guard of the several States, Territories, and the District of Columbia.

Strength and Organization. The National Guard, by the executive order of September 8, 1939, was increased to an authorized strength of approximately 15,000 officers and 235,000 enlisted men.

There are National Guard units in each of the forty-eight States, in Hawaii, Puerto Rico, and Alaska. These units are distributed in 1500 different stations. Like the Regular Army, the National Guard contains units of all the different arms and services that go to form a modern army.

The National Guard infantry divisions, and the States and corps areas in which they have their stations, are as follows:

NATIONAL GUARD INFANTRY DIVISIONS

Corps Area	Division	States
I	26th Division	Massachusetts.
I	43d Division	Connecticut, Maine, Rhode Island, Vermont.
II	27th Division	New York.
II	44th Division	New Jersey, New York.
III	28th Division	Pennsylvania.
III	29th Division	Maryland, Virginia, District of Columbia, Pennsylvania.
IV	30th Division	Georgia, North Carolina, South Carolina, Tennessee.
IV	31st Division	Alabama, Florida, Louisiana, Mississippi.
V	37th Division	Ohio.
V	38th Division	Indiana, Kentucky, West Virginia.
VI	32d Division	Michigan, Wisconsin.
VI	33d Division	Illinois.
VII	34th Division	Iowa, Minnesota, North Dakota, South Dakota.
VII	35th Division	Kansas, Missouri, Nebraska.
VIII	36th Division	Texas.
VIII	45th Division	Arizona, Colorado, New Mexico, Oklahoma.
IX	40th Division	California, Nevada, Utah.
IX	41st Division	Idaho, Montana, Oregon, Washington, Wyoming.

Units of the National Guard, like those of the Regular Army and the Organized Reserves, are designated by numbers. Regiments have, in general, numbers between 100 and 300, and infantry divisions have numbers between 26 and 75.

The National Guard Bureau. The National Guard Bureau in Washington is the central agency which supervises the work of the National Guard. The Chief of the National Guard Bureau is an officer of the National Guard appointed by the President to active duty for four years with the rank of major general. As his assistants he has thirty officers of various arms and services from the Regular Army and the National Guard.

Regular Army Instructors. Officers of the Regular Army are detailed as instructors to the National Guard and assigned to permanent stations by the War Department upon recommendation of the National Guard Bureau. Instructors assigned for duty with the headquarters of National Guard divisions are referred to as "division instructors." The senior line officer of the Regular Army on duty with the National Guard of a State is referred to as the "Senior Instructor" of that State. Other officers are referred to as "instructors." The *Army List and Directory*, October 20, 1939, listed 424 officers of the Regular Army on duty with the National Guard; of this number seventeen were drawn from the Medical Corps.

The President may detail one officer of the Regular Army as chief of staff and one

(*Sec. 65, National Defense Act*)

officer of the Regular Army or the National Guard as assistant to the chief of staff of any division of the National Guard in the service of the United States as a National Guard organization: *Provided*, That in order to insure the prompt mobilization of the National Guard in time of war or other emergency, the President may, in time of peace, detail an officer of the Regular Army to perform the duties of chief of staff for each fully organized tactical division of the National Guard.

THE ORGANIZED RESERVES

Organization and Purpose. The Organized Reserves consist of the Officers' Reserve Corps, the Enlisted Reserve Corps, and the Organized Reserve units. It constitutes one of the components of the Army of the United States, the other two being the Regular Army and the National Guard.

The Officers' Reserve Corps, consisting of 119,773 officers at the close of the fiscal year 1939, is composed of men who have voluntarily accepted commissions therein, from second lieutenant to brigadier general. Serving generally on an inactive status without pay, they are occasionally ordered to short periods of active duty; during the fiscal year ending June 30, 1938, a total of 27,685 received this training. The older officers are those who served, mostly as officers, during the World War. The younger officers have been commissioned since the war, usually after graduation from the Reserve Officers' Training Corps.

The Enlisted Reserve Corps is composed of persons voluntarily enlisted for service in the corps.

The Organized Reserve units are composed of officers of the Officers' Reserve Corps and of enlisted men of the Enlisted Reserve Corps. Many such units are officered at war strength, prepared for mobilization, the reception of enlisted personnel, and further trained to perform their functions in the event of war. Units allotted to each corps area usually include three infantry divisions and a proportion of corps, army, auxiliary, and special troops. Within corps areas, units are allocated to states by corps area commanders, under general instructions issued by the War Department. War strength tables of organization form the basis of organization. Plate 4 shows the allocation of Organized Reserve divisions. Regiments are numbered serially starting with 301. Divisions are assigned numbers starting with 76.

For administrative control, Reserve officers are under the jurisdiction of the commanders of the corps area in which their permanent residences are located.

Chiefs of arms and services exercise assignment jurisdiction over all Reserve officers of the arm and service assignment group. In addition they have an interest in the well-

being and technical development of their respective arms and services in all components of the Army.

Commanding officers of units and installations, whether Regular Army or Reserve officers, exercise command over and administrative control of all officers assigned to their organizations.

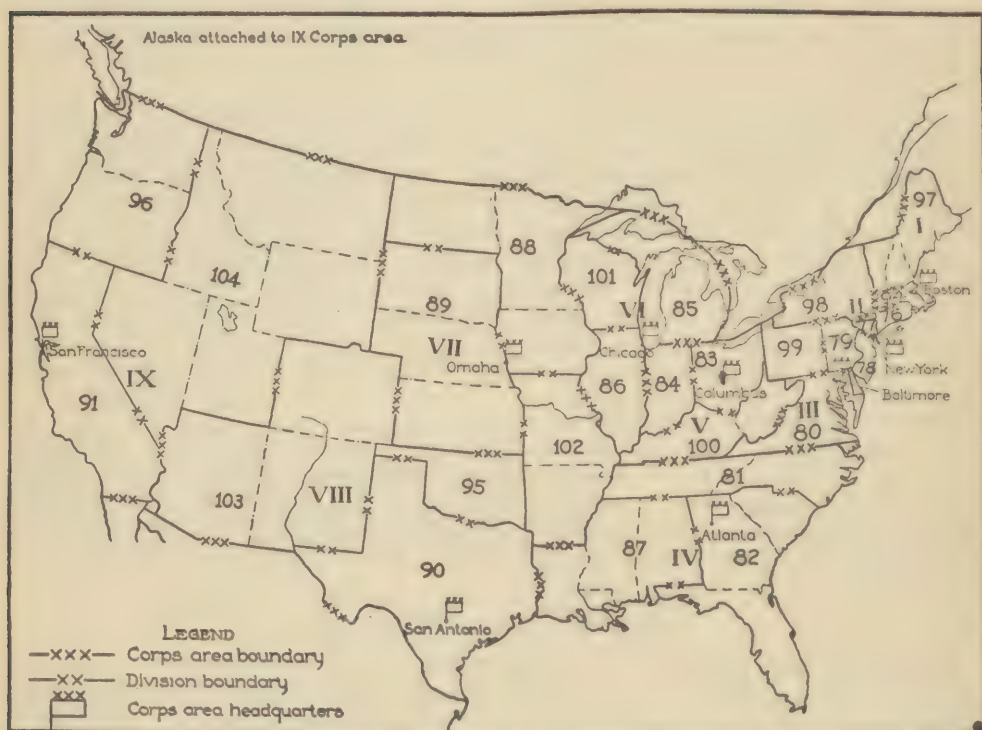


Plate 4. Organized Reserves—Division Areas.

Sections of the Officers' Reserve Corps. The authorized sections of the Officers' Reserve Corps correspond with the arms and services of the Regular Army. But in addition to these, several other sections have been established in the Officers' Reserve Corps by the President's direction in which officers procured for special purpose are commissioned. The existing sections, with their proper abbreviated designations, are listed below:

- Adjutant General's Department Reserve, AG-Res.
- Air Corps Reserve, Air-Res.
- Cavalry Reserve, Cav-Res.
- Chaplain's Reserve, Ch-Res.
- Chemical Warfare Service Reserves, CW-Res.
- Coast Artillery Corps Reserve, CA-Res.
- Corps of Engineers Reserve, Engr-Res.
- Field Artillery Reserve, FA-Res.
- Finance Department Reserve, Fin-Res.
- Infantry Reserve, Inf-Res.
- Judge Advocate General's Department Reserve, JAG-Res.
- Medical Department Reserve.
 - Dental Corps Reserve, Dent-Res.
 - Medical Administrative Corps Reserve, MA-Res.
 - Medical Corps Reserve, Med-Res.
 - Sanitary Corps Reserve, Sn-Res.
 - Veterinary Corps Reserve, Vet-Res.

Military Intelligence Reserve, MI-Res.
Military Police Corps Reserve, MP-Res.
Ordnance Department Reserve, Ord-Res.
Quartermaster Corps Reserve, QM-Res.
Signal Corps Reserve, Sig-Res.
Specialist Reserve, Spec-Res.
Inactive Reserve, Inact-Res.

Appointment of Officers. In time of peace a Reserve officer must at the time of appointment be a citizen of the United States or a citizen of the Philippine Islands in the military service of the United States, between the ages of 21 and 60 years. Initial appointments in the lowest grades of the Officers' Reserve Corps are restricted to applicants who on date of appointment do not exceed the following ages:

(1) *Thirty years.* For the Infantry, Cavalry, Field Artillery, Coast Artillery Corps, Air Corps, Corps of Engineers, and Signal Corps.

(2) *Thirty-five years.* For the Adjutant General's Department, Quartermaster Corps, Finance Department, Medical Department (including Dental, Medical Administrative, Sanitary, and Veterinary Corps), Ordnance Department, Chemical Warfare Service, Chaplains, Military Intelligence Reserve, and Specialist Reserve.

(3) *Forty-two years.* For the Judge Advocate General's Department Reserve.

In applying these age limitations, persons who have attained their thirtieth, thirty-fifth, or forty-second birthdays, respectively, will be considered as ineligible for appointment.

The length of appointment in every case is for a period of five years, but an appointment in force at the outbreak of war or made in time of war will continue in force until six months after the termination of the war, should the 5-year period covered by the appointment terminate prior to that time.

Reappointment of Officers. When the 5-year period of appointment of a Reserve officer (*PAR 26, AR 140-5*)

expires, he may be reappointed in his former grade and section with eligibility for promotion, assignment, and active-duty training in peace time, provided he passes a satisfactory physical examination and it has been officially recorded that during his current appointment he has established his eligibility as provided below:

(1) He has obtained a certificate of capacity for promotion to the next higher grade; or

(2) He has obtained a certificate of capacity for his present grade; or

(3) He has demonstrated his interest in military affairs by having a written record of at least 200 hours of credits, of which at least 100 hours have been earned on an inactive-duty status. Inactive-duty credits are earned by Army extension course work, attendance at classes, administrative duties in connection with his unit, or active participation with troops on inactive-duty training. Credit for 100 hours is given for each 14-day period of active duty provided only that an efficiency rating of "Satisfactory" is attained under the entry "Manner of performance."

(4) He has satisfactorily completed the prescribed course of instruction for Reserve officers at the special service schools of his arm or service or the special course for Reserve officers at the Command and General Staff School, or at the Army War College.

In case eligibility has not been thus established, he may be reappointed for one 5-year period only, to the same grade and section without eligibility for promotion, assignment, and active duty training in peace time.

Promotion. Members of the Officers' Reserve Corps may obtain promotion, successively, through all grades of the Army, including the grade of major general. In general, the qualifications to be demonstrated include professional fitness, the existence of an appropriate vacancy in the higher grade, minimum service in each grade prior to promotion as shown hereafter, and the completion of at least 14 days of active training with an efficiency rating of at least "Satisfactory." He must again pass the required physical examination. The appointment of general officers is subject to confirmation by the Senate.

The required minimum service in each grade is as follows:

	Years
As a second lieutenant	3
As a first lieutenant	4
As a captain	5
As a major	6
As a lieutenant colonel	7

Professional fitness is demonstrated, in part, by earning a "certificate of capacity" for promotion to the next higher grade. This is defined as an instrument, issued by the corps area commander of the officer concerned, that the officer named therein has met the professional qualifications prescribed for the grade and section specified in the certificate. A certificate of capacity is obtained by an applicant after the successful completion of two essential requirements: (1) A written military knowledge examination designed to test the applicant's military knowledge qualifications; (2) A practical test designed to test the applicant's ability qualifications. The former is conducted by an individual examiner appointed by the corps area commander; the latter is conducted by a board of officers appointed for that purpose.

The subjects in which military knowledge and practical ability must be proven are prescribed, for each branch and grade, in separate Army Regulations of the 140 series.

Waivers and exemptions may be secured for promotion through the following methods:

(1) By satisfactory completion of appropriate courses of instruction for National Guard and Reserve officers at general and special service schools.

(2) By completing appropriate subcourses of the Army extension courses.

(3) By submitting evidence of graduation, for promotion to grade of 1st lieutenant only, from the United States Military or Naval Academies, Air Corps Training Center, or senior units of the ROTC. Graduation must have been within five years of application for certificate of capacity or promotion. Waiver is restricted to subjects in which instruction was received at the institutions listed.

(4) The efficiency ratings awarded for periods of active service may be accepted in lieu of the practical tests. Ratings of not less than "Satisfactory" are required.

Active Duty. In time of a national emergency expressly declared by Congress, the (PAR 53, AR 140-5)

President may order Reserve officers to active duty for indefinite periods without their consent.

In time of peace Reserve officers may not be ordered to active duty without their consent.

For training purposes, Reserve officers are ordered to active duty for periods of 14 days in numbers determined by the amount of the annual appropriation for that purpose. This training is restricted to those who qualify themselves by pursuing appropriate extension courses or taking other inactive duty training.

In addition to active duty for 14-day periods, active duty is available for Reserve officers for the following purposes:

(1) As additional members of the War Department General Staff.

(2) As student officers at special courses conducted for or available to Reserve officers at the special service schools, the Command and General Staff School, and the Army War College.

(3) For duty with tactical units of the Air Corps.

(4) For duty as instructors for periods of not more than 30 days at Citizens' Military Training Camps.

(5) For extended active duty of 1 year with the Regular Army.

Training. The ultimate object in training units of the Organized Reserves in time of peace is to provide partially organized and partially trained units which may be readily expanded to war strength and completely trained in time of emergency and which, in combination with the Regular Army and the National Guard, will provide an adequate, balanced, and effective force sufficient to meet any national emergency declared by Con-

gress. The primary purpose is efficient mobilization. The objects in training the individual Reserve officer in time of peace are: (1) To prepare him to perform efficiently the duties of his mobilization assignment; (2) To prepare him for promotion to the next higher grade.

The facilities for training while on an *inactive status* are as follows:

(1) Courses of instruction at troop schools and group schools. These schools are established at home stations of units of the Organized Reserves. Subjects of instruction include applicatory exercises employing map problems, map maneuvers, and tactical exercises; in addition, the instruction may include conferences for discussion of assigned subjects or mobilization plans.

(2) Army Extension Courses.

(3) Special assemblies of officers for individual training in the tactics and technique of their arm or service.

(4) Duty on various boards of officers, on inactive status.

(5) Attachment to units of the Regular Army or National Guard.

(6) Duty on an inactive status at special and general service schools.

(7) Firing practice on inactive status.

(8) Use of Army aircraft.

The facilities for training while on *active status* include the following:

(1) Utilization of the 14-day training period.

(2) Duty at special assemblies for individual training in the technique or tactics of an arm or service.

(3) Active duty with the Regular Army or the National Guard.

(4) Duty on active status on various boards of officers.

(5) Active duty as instructor at Citizens' Military Training Camps.

(6) Specified courses at the various special service schools and the Command and General Staff School.

(7) Selected courses at the Army War College.

Uniform Regulations. A Reserve officer on active duty is required to wear the uniform, including insignia, prescribed for officers of the Regular Army. Blue uniforms, however, are not required to be worn by Reserve officers although they are authorized to be worn. Reserve officers who are not on active duty and when within the United States or its possessions may wear the uniform on occasions of military ceremony, at social functions of a military character, at informal gatherings of the same character, when engaged in the instruction of a cadet corps or similar organization, or when responsible for military education at an educational institution.

Pay and Allowances. Except for travel pay incident to 14-day periods of active duty, Reserve officers are entitled to the same pay, rental, subsistence, and travel allowances as prescribed for officers of the Regular Army.

Officers on Duty with Organized Reserve Units

	Colonel	Lt. Colonel	Major	Captain	1st Lieut.	Total
Air Corps	1	11	9	....	21	
Cavalry	17	19	26	2	....	64
Chemical Warfare Service	1	1	....	....	....	2 ¹
Coast Artillery	17	14	16	1	....	48
Engineers	3	2	14	26	11	56 ¹
Field Artillery	11	17	60	6	....	94
Infantry	37	32	129	3	....	201
Medical Corps	1	13	....	4	....	18 ¹
Ordnance .....	....	....	4	1	....	5
Quartermaster Corps	3	....	14	4	....	21 ¹
Signal Corps .....	....	1	2	1	....	4
Veterinary Corps .....	....	1	....	....	....	1 ¹
Total	90	101	276	57	11	535

¹ Includes those assigned "in addition to their other duties."

Regular Army Personnel. Officers and enlisted men of the Regular Army are assigned by the War Department for duty as instructors with the Organized Reserve units. The accompanying table shows the distribution of these officers by grade and branch as shown by the Army List and Directory, October 20, 1939.

The primary duty of Regular Army officers is to give by advice and assistance the fullest aid in the theoretical and practical instruction and training of the organization to which they are assigned. Since one of the outstanding duties of regimental instructors is to develop teaching ability and qualities of leadership, Regular Army instructors will refrain from actual conduct of instruction except in those cases, where in their judgment, the situation so requires. By the exercise of this function Reserve officers are provided with an opportunity to develop confidence and a degree of enthusiasm which will insure success in an emergency.

The efficient execution of this assignment will tax the ingenuity of the best officers. Local conditions are subject to the widest variation. Regardless of these conditions, there are many common problems which must be solved by all officers who undertake this duty. They must secure and maintain a close and harmonious contact with all officers who look to them for instruction. An intimate acquaintance is advisable since it facilitates an appraisal of individual qualifications and provides a means of determining the steps which should be taken to fit each one for the proper performance of their duties. This information is vital because recommendations must be made for important assignments such as attendance at special or general service schools, selection of instructors of CMT camps, and for special assignments such as duty with the Civilian Conservation Corps. Reserve officers will give their time for evening instruction only to the extent that the instruction is made interesting and valuable; therefore the instructor must make very certain that subjects are appropriate, that proper preparation is made, and that presentation is made in an interesting manner. Whether or not the instructor actually conducts such classes, he must attend regularly and by his presence stimulate discussion. From time to time special courses of instruction will be prescribed by the corps area commander. He must make certain that the unit mobilization plan is completely and accurately prepared by the unit commander. His office is an important distribution and mailing center, and he must maintain a well managed office for the care of personnel and other necessary administrative records of the unit. He must be an active supporter of other activities and components of the Army of the United States which are within the zone of his station and area. Finally he must establish himself within the community in which he lives and works. This may well include affiliation with representative civic organizations and local activities to the end that the public may be informed, through all proper means, of the program for national defense and the current policies for its advancement. From all of the foregoing it should be quite obvious that this duty provides a splendid opportunity, the successful execution of which will require the full time and best efforts of those officers charged with this mission.

Active Duty Law. The Act providing for one year of active duty which became law in 1940 is included in Chapter II.

The Reserve Officers Association. The Reserve Officers Association has for its object the support and assistance of the development and execution of a military policy for the United States which will provide adequate National Defense. It has national officers, and maintains an office at 1653 Pennsylvania Avenue, N. W., Washington, D. C. It publishes *The Reserve Officer*, a monthly magazine which contains information of interest to the service as a whole and to the Organized Reserves in particular.

Throughout the United States local chapters of the association sponsor the work of the Organized Reserves, encourage interest in the national defense, and conduct periodic meetings for instruction.

This Association is active, makes important contributions to the progress of national defense, and richly merits the active support of all components of the Army of the United States.

THE RESERVE OFFICERS' TRAINING CORPS

Objects of the Reserve Officers' Training Corps (ROTC). The general object of the (PAR 2, AR 145-10)

courses of instruction of the ROTC is to qualify students for positions of leadership in time of national emergency. Primarily, it is an agency for the production of Reserve officers for those arms which are restricted as to their sources of production, and it should produce for those arms the number of Reserve officers required in the initial periods of a general mobilization.

There is a very important by-product which accrues to the benefit of the nation from our system of military training in schools and colleges. Those of our citizens who know from study or experience the futility of national weakness are not readily swayed by the specious arguments of the few among our people who seek to weaken or destroy our system of national defense. The presence in all professional groups of an increasing per cent of leaders who have enjoyed the benefits of military instruction serves as a stabilizing influence over the whole nation which supports and champions a sympathetic understanding of the needs of the military establishment and its purposes.

Students who complete the course, according to their own abundant testimony, secure personal benefits which are valuable to them in their occupations. They are better citizens because they have had inculcated an understanding of the responsibilities of citizenship. They realize more fully that the benefits their own generation enjoys were secured by the sacrifices made by their predecessors. They learn the necessity for discipline, the responsibility of an individual to the group as a whole, and the methods by which discipline is developed and enforced. Finally, they learn the principles of leadership and have an opportunity to exercise this art to a greater extent than that which is available to them in any other phase of their instruction.

Thus our system of military education in schools and colleges provides valuable benefits to the nation, to the Army of the United States, and to the individuals who participate in its activities. In a democracy this is the better way.

Authorization of the Reserve Officers' Training Corps. The Act of Congress approved June 3, 1916, as amended by the Act of June 4, 1920, established for the United States the system of military education in schools and colleges as we have it today. By these provisions the Reserve Officers' Training Corps has become an important part of the well-integrated system of national defense upon which the nation now relies. The essential soundness of the basic Acts is well attested by consideration of the amending legislation through the years which has been concerned largely with matters of improvement or clarification. Based upon a concept which adheres strictly to American principles and ideals, the policy of military training in educational institutions has proven itself by its economy, its efficiency, and the excellence of the very large number of Reserve officers who have been commissioned into the Army of the United States.

Extent of Military Education. During the academic year 1939-40, the *Army List and Directory* records 310 educational institutions which maintain one or more units of the ROTC. The following chart lists the annual enrollment since 1919-20.

Medical units of the ROTC were in operation during the academic year 1939-40 at the following institutions:

Boston University, Boston, Mass.

University of Vermont, Burlington.

Cornell University Medical College, New York City.

Syracuse University, Syracuse, New York.

University of Buffalo, Buffalo, New York.

Georgetown University, Washington, D. C.

George Washington University, Washington, D. C.

Jefferson Medical College, Philadelphia, Penna.

University of Pennsylvania, Philadelphia.

University of Pittsburgh, Pittsburgh, Penna.

Medical College of Virginia, Richmond.

Vanderbilt University School of Medicine, Nashville, Tenn.

Indiana University, Bloomington.

Ohio State University, Columbus.

Western Reserve University, Cleveland, Ohio.

University of Michigan, Ann Arbor.

The State University of Iowa, Iowa City.

University of Minnesota, Minneapolis.

St. Louis University School of Medicine, St. Louis, Mo.

Washington University, St. Louis, Mo.

Baylor University, College of Medicine, Dallas, Texas.

University of California Medical School, San Francisco.

University of Oregon Medical School, Portland.

Supervision by the War Department. The War Department is the agency of the Federal Government charged by law with the preparation of regulations and instructions carrying into effect the provisions of the national defense act and other federal statutes relating to the ROTC, and is likewise charged with the supervision of the execution of the provisions of pertinent law and regulations. In general, the supervisory powers of the War Department are delegated to the corps area commanders who act as the immediate representatives of the War Department in all relations with the educational institutions, and they are responsible that the requirements of law and regulations relating to this subject are effectively carried out.

Control at Institutions. The control of the operation of ROTC units at institutions is vested in the institutional authorities. Civilian heads of institutions exercise the same general control over the department of military science and tactics that they ordinarily exercise over their other departments.

This provision of the regulations, while not difficult of execution and compliance, includes a dual responsibility for the officers on ROTC duty. In their strictly military capacity these officers are subordinates of the corps area commander and are subject to his orders. In their academic capacity they are subject to institutional regulations. Direct correspondence between superior military authorities and professors of military science and tactics is limited to subjects of a purely military nature.

Eligibility for Enrollment. Eligibility to membership in the ROTC is limited to students at institutions in which units of the corps may be established, who are citizens of the United States, who are not less than 14 years of age, and whose bodily condition is such as to meet the prescribed physical standard.

In general, a student is ineligible for enrollment who is a member of any component of the Army of the United States, the Navy, or of the Marine Corps.

Basic and Advanced Courses. The four years' ROTC course of the senior division is divided into the *basic course* and the *advanced course*. The basic course consists of the first two years in the department of military science and tactics which correspond to the Freshman and Sophomore years in the academic departments. The advanced course consists of the last two years in the department which correspond to the Junior and Senior years.

Students electing the ROTC training courses do so for only two years at a time. The first election is for the two years' basic course, and completion of the basic course is a prerequisite for advancement. Upon the completion of the basic course, if a student be recommended for further training, he may elect the advanced course. Once the student has signed an agreement to take the advanced course it becomes a requirement for academic graduation by virtue of the fact that the institution has agreed to make it a required subject of the institutional course. Entrance into the advanced course is both voluntary and selective in that it is entirely optional with the student as to his application, and entirely optional with the professor of military science and tactics whether he shall be accepted. Attendance at one summer camp of six weeks' duration is a requirement of the advanced course.

Hours of Instruction. The minimum number of hours of instruction required to be given in the basic course is an average of 3 hours per week, and in the advanced course, 5 hours per week. An exception is made for medical units in which 90 hours per annum is required in both the basic and advanced courses.

An hour in the program of instruction represents the customary academic hour of 50 minutes.

Strength of the ROTC

Year	Jr. Div. ¹	Senior Div. ²	Graduates	Graduates Appointed To ORC
1919-20	45,139	43,605	(No record)	135
1920-21	46,538	44,253	1,272	934
1921-22	37,225	51,742	2,774	2,465
1922-23	37,346	57,505	4,143	3,786
1923-24	40,324	63,570	4,370	4,048
1924-25	42,190	69,368	5,069	4,884
1925-26	38,225	68,553	5,919	5,728
1926-27	38,148	70,809	5,956	5,836
1927-28	39,978	72,371	6,127	6,013
1928-29	40,521	71,903	6,293	6,049
1929-30	41,334	73,030	5,969	5,684
1930-31	41,637	75,786	6,062	5,602
1931-32	40,556	73,989	6,447	5,418
1932-33	39,466	66,729	6,663	6,497
1933-34	38,728	65,419	6,495	6,490
1934-35	41,053	76,260	6,390	6,350
1935-36	53,202	92,688	5,663	5,619
1936-37	57,777	101,728	5,960	5,848
1937-38	61,791	106,041	6,425	6,337
1938-39	65,282	111,614	³ 6,780	6,700
1939-40	68,895	117,855	7,894	6,709
Totals			112,671	107,132

¹ In secondary schools.

² In colleges, universities and essentially military schools.

³ Approximate number.

Courses of Instruction. Courses of instruction are furnished by the Adjutant General, and it is required that all instruction be conducted in accordance therewith. These programs and courses are prepared by the chief of the respective arms and services.

Pay and Commutation of Subsistence. Students who are accepted and enrolled in the advanced course are furnished commutation of subsistence at the expense of the United States at such rate, not exceeding the cost of the garrison ration prescribed for the Army, as may be fixed by the Secretary of War, during the remainder of his service in the ROTC, not exceeding two years.

Advanced course students in attendance at the required ROTC camp (*AR 145-30*) are paid for attendance at such camps at the rate prescribed for soldiers of the seventh grade of the Regular Army. As subsistence at camp is furnished in kind, the student does not receive commutation of subsistence during this period.

A student who completes the advanced course and the camp receives approximately \$200 in commutation of subsistence and pay. While this is an attractive feature which may stimulate some additional enrollments, many students who work during the summer months regard this income as recompense, in part, for their inability to obtain employment during the summer in which they attend camp. The cost of ROTC texts and the expense for their initial outfit of uniforms and necessary equipment are factors which reduce the actual net proceeds to the student. The reimbursement of students in the advanced course may have little effect upon total enrollment, but it assures a student that his initial outlay for uniforms will be offset by this income.

Assignment of Officers to ROTC Duty. The procurement, assignment, transfer, and relief of commissioned officers and warrant personnel are functions of the War Department.

Personnel is apportioned to units with due reference to the kind of unit and the number of students undergoing instruction, endeavor being made to provide a suitable number of instructors for each unit.

It is the policy of the War Department that all details of officers at civil educational institutions will be made with the concurrence of the institutional authorities concerned and will, in general, be for a minimum of four years.

Duties of the Head of the Military Department. When one or more officers are detailed to an educational institution for duty with the ROTC, the senior line officer will be the professor of military science and tactics and will be the head of the department. Where officers of the services only are detailed to an educational institution the senior officer thereof will assume these responsibilities.

It is considered essential to the effective performance of his duties that the professor of military science and tactics have the academic rank which the institution accords the heads of its other departments, that he be a member of the faculty and, as such, entitled to all the rights and privileges of a faculty member with responsibilities and obligations similar to those of the heads of other departments.

The professor of military science and tactics (PMS&T) coordinates the instruction of the several units in the department. All reports, records, and other administrative requirements are performed under his supervision.

It is also considered essential by the War Department that the PMS&T be empowered to draft the rules, and orders relating to the organization, control, and training of the members of the ROTC and the appointment, promotion, and reduction of cadet officers, at civil colleges and schools (Class CC and CS), subject to coordination with general institutional regulations and arrangements and the approval of the head of the institution. At military colleges and essentially military schools (Class MC, MI, and MS) where the PMS&T is not charged with the discipline of cadets, this power except in respect to training, may properly be exercised jointly by the PMS&T and the commandant of cadets under the supervision of the head of the institution.

Restrictions Applied to Officers. Officers are required to live at or near the institution to which assigned.

They are required to appear in the proper uniform when in the performance of their military duties (including classroom instruction as well as the practical exercises).

Officers are prohibited from conducting any course of instruction in the institution other than those prescribed by the War Department.

Officers may not pursue any course of instruction conducted by the institution until after the completion of two years of their details and then only subject to approval by the War Department in each individual case. An exception to this general ruling is that a corps area commander may authorize an officer to pursue pedagogical and allied psychological courses for the purpose of familiarizing themselves with the instructional policies in respect to methods of instruction and improving instructional methods in the ROTC.

Appointment of Graduates as Reserve Officers. Graduates of ROTC courses who fulfill the requirements in all ways may be commissioned into the Army of the United States as Reserve officers. Appointments are made only in the lowest authorized grade of the proper section.

The annual increment of young Reserve officers into the Officers' Reserve Corps is a very important addition to the national defense. As the years pass, there is an ever-decreasing number of officers with World War experience, and the per cent of officers trained for the Reserve in the ROTC increases accordingly. The Army and the Nation have come to rely on the system of military education in colleges and universities for the supply of trained officers to be available in a time of national emergency. It is a national asset of proven value.

The Thomason Act. The provisions of the enactment, popularly known as "The Thomason Act," authorize 1000 Reserve officers annually to serve one year with the Regular Army. From the number placed on duty, certain officers are selected for permanent appointment in the Regular Army. For the most part, the Reserve officers selected for this duty are drawn from the most recent graduates of the ROTC.

CHAPTER II

BACKGROUND FOR MOBILIZATION PLANNING

Introduction. Mobilization is the process for assembling the man power and other necessary resources of the nation to meet emergency or war conditions. Responsibility for mobilization planning is placed in the hands of the War Department by the provisions of the National Defense Act, June 3, 1916, as amended. Unlike the conditions faced by other nations, the United States is free from the constant need of preparation to defend against a particular potential enemy. Our geographical position is favorable. Relations with our neighbors are not warlike. Our legislation and planning is based on the realistic principle of readiness to meet all threats to the welfare of the nation however or whenever they may arise. In harmony with a national policy which does not seek territorial expansion but desires only to preserve that which it has, our military doctrine is essentially conservative. Our nation has tried lack of preparedness and has been embroiled in wars. Time after time we have been obliged to create the great bulk of our armed forces after the outbreak of hostilities. We have learned at great cost that a love of peace, a hatred of war, does not prevent its recurrence. Our people have witnessed the destruction of other nations which desired devoutly to remain at peace. We recognize, at last, the hopeless futility of weakness. The acceptance in 1940 of compulsory military service in peacetime sustains the point. The problem of mobilization of man power in time for completion of training before meeting the conditions of war is a matter of the utmost importance.

At the outset the reader must understand that no member of the Army has any power or voice in deciding whether, under any conditions whatever, resort shall be made to war. It is incredible, but for some obscure reason many of our people close their eyes to this obvious fact. The Constitution of the United States provides that war can be declared only by vote of the Congress in the form of a resolution which must be approved by the President. Since the members of the civil government are elected by the people it follows that a declaration of war is, in fact, a declaration for the people. However, once this decision has been made by the civil leaders of the nation, to the Army falls the bitter task of winning the war in order to restore the peace.

It must also be realized that the strength of the armed forces and the nature of its equipment are fixed by the Congress. The decision as to whether the Army shall be large or small, strong or weak, is their decision. In times of peace, economy and other consideration have required our armed forces to be relatively small. The nation may take pride in the loyalty of the hundreds of thousands of patriotic citizens who have volunteered their services in the several components of the Army of the United States. In 1940-41, with strong nations at war, the time arrived to augment the volunteer services. Time is of the essence in this increase. The process of augmentation of volunteers by selective service for training is included in mobilization.

A study of mobilization planning is not complete which fails to include a thoughtful analysis of the reasons for maintaining armed forces during peace time and of the reasons for anticipating the possibility of war. "We don't want war, we hate war, we seek to avoid war," say some, "hence, why should we prepare to engage in war?" Such questions, often propounded, are indicative of shallow reasoning, of failure to observe the plights of the weak and unprepared nations, or the facts of our own past experience. *Weakness invites aggression.* Contemplation of the events of Europe and Asia during the period 1935-1940 should alone be sufficient. Our own history is similarly convincing to those who will read it. Weakness was a direct cause of the War of 1812. The Civil War might well have been prevented had the federal government possessed sufficient strength. We were poorly prepared in 1917 at a time when our love of peace and hope for neutrality were no less than they are today. But war came. Now it is disclosed by official records of the German Government¹ that the acts which led to our entry

¹ *Why We Went to War.* Newton D. Baker. Chapter VII, see also Chapter X.

would never have been perpetrated against us except for the conviction in the minds of others that we were too weak to implement our objections. We have observed the consequences of the unbridled use of power, or threats to use power, and refuse to become its victims. Armament is power. It may be the greatest power in the hands of man. It requires no great philosopher to realize that power of any kind may be abused. If further evidence is necessary one need only contemplate the conditions which confronted the peaceful, neutral nations of Europe during 1939 and 1940 and realize the fate they endure. "Only the strong can be free," said a presidential candidate during the campaign of 1940. It is a sad commentary on modern civilization, but it is the regrettable truth. Such a fate we seek to avoid. This is one of two important reasons for maintaining our system of national defense capable of obvious prompt expansion to meet any emergency: *First, we intend by our strength to ward off the attacks of others, which we mean not to provoke, that weakness might again invite.*

There is a second reason, perhaps of even greater importance, for providing the means for raising a large and strong army. Notwithstanding our will to peace it is possible, but not inevitable, that again we may resort to war. The love of peace is shared by thoughtful people of all nations. Not all of the nations engaging in the resumption of war in 1939 accepted the unhappy condition without first exhausting every resource to avoid it. We continue to seek by every honorable means to avoid the possibility and reduce the risk. We have been successful for the last one-fifth of a century. There is strong reason to hope that we may continue to be successful because we know a little better the causes of war and how to avoid them. The possibility that war may recur confronts us, just as it does other nations. This nation has interests and ideals for which our people would rather fight than surrender. We reject the cowardly philosophy of peace at any price. We place Honor above price. There are predictable conditions under which the people of this nation would not recoil from the scourge of war. The purpose of our military program is to be ready for it, should it come. The second of the two basic reasons for maintaining a system of national defense is thus disclosed: *If our peace becomes forfeit we will wish to restore it to the very hands of those from whose grasp it was allowed to slip, and under conditions of our own choosing.*

Consideration and appreciation of the reasons for mobilization planning must be kept in the foreground. Many of our people have drawn erroneous conclusions about this vital subject. Facts may enlighten the great number of misinformed whose minds have not been closed to reason. Furthermore, it is all too easy for those charged with some phase of this planning, however obscure, to become so engrossed with the details of the responsibility that its broad and essential purposes are overlooked. We must realize that it is in the protection of the people and the preservation of the nation that the task is continued. If those who are charged with the responsibility of mobilization planning will keep its essential purposes before them they will drive more surely to the desired goal, and the products of their thoughts are more likely to sustain the needs.¹

Basic Mobilization Policy of the United States. The basic policy of the United States as to mobilization is to provide, initially, a moderate but balanced force of such size and character as to permit its being speedily and properly armed and equipped for the defense of United States territory. This initial step having been accomplished, the next action following in logical sequence is to augment this force progressively as necessary to meet the need of the situation actually presented.

Responsibility for Mobilization Planning. The President may initiate mobilization, if necessary, under his constitutional as well as his statutory powers. If the emergency so requires he may continue it under special powers that may be conferred by the Congress.

The National Defense Act, June 3, 1916, as amended, delegates to prescribed agencies of the War Department responsibility for the development of plans for mobilization for national defense. The Chief of Staff is charged with the planning, development, and execution of the military program of which mobilization planning is an essential part. The War Department General Staff is required to prepare the necessary plans for the

¹ The causes of war and the hazards to peace are presented more fully in Chapter XXIII, *The Officers' Guide*, 4th Edition, Military Service Publishing Company.

mobilization of manhood of the nation in an emergency. Corps area commanders are charged with the development of mobilization plans in the areas and for the units over which they exercise control. The Assistant Secretary of War, under the Secretary of War, is charged with making provisions for the mobilization of matériel and industrial organizations essential to wartime needs.

The development of details of these plans extends throughout the military structure. The system cannot reach its full worth until all organizations which are not fully constituted in peace are informed and trained in what they may be called upon to do, and know exactly how and where they will take the initial steps. Thus, many organization commanders are continuously concerned with the development of detailed plans in accordance with policies announced by the War Department.

The Initial Military Program. The initial military program includes the force which can be mobilized and supplied initially from resources available.

The Protective Mobilization Plan (PMP) provides for mobilization of a balanced force at the maximum monthly rate up to a total force not to exceed that authorized (by the Congress and the Executive) for the initial military program. It includes plans for constituting units with the overhead and replacements which are necessary to maintain them to meet the initial requirements of any probable emergency.

The Initial Protective Force, as its name implies, is a mobile force including that part of the Army of the United States which is maintained, trained, and equipped so as to be available for prompt concentration and employment on any mission, including combat, which may be directed by the Secretary of War obedient to laws enacted by the Congress and approved by the Executive. It may be regarded as a screen available to hold off an enemy or protect the nation pending the development of the larger forces which may be found necessary for the accomplishment of the mission. Of course, in a minor emergency, the initial protective force may be sufficient and augmentation become a minor matter. As it exists today the initial protective force consists of the Regular Army and the National Guard.

Augmentation Plans. An emergency may occur which requires a larger force than that authorized for the initial military program. It is conceivable that the maximum national effort may be required. The Augmentation Plans make provisions for the extension of the initial military program which might be required for a prolonged national effort. They provide the additional forces considered necessary to meet the most serious situation which may confront the nation.

Scope and Application of the Plans. The entire scheme of mobilization planning is applicable to all conceivable requirements in man power from the smallest emergency requiring the use of armed force to the largest. The Regular Army, for example, might be entirely adequate to deal with the emergency; or it might be necessary to employ only the Initial Protective Force and the troops necessary for its replacement, supply, and maintenance. If this were insufficient, the total strength contemplated under the Protective Mobilization Plan could be formed. Finally, in the extreme case, the maximum strength of the nation can be developed under the Augmentation Plan.

Even a cursory study of the military policy of the United States from its inception indicates the wisdom of these arrangements. The Nation has embraced a series of fallacies in its military policies and then, after seeing them fail in a series of wars, has chosen to reaffirm them. Finally the lesson has been well learned. Abhorrence of war does not prevent a peaceful nation from being embroiled in war. Armies cannot be created overnight, nor armed, equipped, and trained to enter combat with the speed which may be required. The existing national defense act recognizes our past mistakes and provides the authorization and machinery for adequate planning. The mobilization plans as now developed are the fruits of this foresight.

Personnel Requirements. Sudden increase in the strength of the armed forces incident to mobilization has, as its first step, the problem of determining personnel requirements. This is a matter of detailed computations to obtain the numerous data necessary as to number, grade, arm or service, specialties, ratings, white or colored, and similar requirements. All computations possible are made ahead of time during peace, but since the

actual units and installations to be mobilized cannot be known until the situation develops, preparations are also made to recompute rapidly during mobilization. The procedures for filling requirements include (1) utilization of available personnel, and (2) procurement. Personnel procurement measures are necessary to obtain the required number of officers, nurses, warrant officers, officer candidates, enlisted men, and civilian employees to fill vacancies which cannot be filled by personnel already available in peace time. Provisions must also be made coincidentally to insure the presence of necessary loss replacements. The system adopted must supply the man power at the time, in the numbers required, and within the capacity of the system for reception and for its classification, assignment, supply, and training. Those of our citizens who cannot meet the physical standards for service with the armed forces should be provided opportunity to serve the country, if they so desire, in other capacities where they are needed and for which they are qualified. The needs of army units for men of special training must be satisfied. Essential civilian requirements, especially in industry, must not be curtailed.

One of the very great advantages of the National Defense Act is in its provisions for officer personnel. At the outbreak of the World War this was possibly our greatest weakness and the factor which had the greatest effect upon the delay in training our wartime army. There were only the relatively small numbers of officers of the Regular Army, and of the National Guard, and the very few members of the Officers' Reserve Corps which had at that time been recently instituted. As a result it was slightly over four months after the declaration of war before the first large increment of officers became available for duty. The condition is far different today. The Regular Army and National Guard are each materially stronger in officer strength. The Officer's Reserve Corps provides a huge reservoir of over 100,000 officers available for call into active service, and their numbers are being augmented annually through the Reserve Officers' Training Corps and the Citizens' Military Training Camps. The vast majority of the initial requirements in officers, even for a major emergency, are already satisfied. Additional numbers of officers would be developed through training as officer-candidates and would be commissioned as officers after demonstrating their capacity.

Procurement of the great numbers of enlisted men which might be necessary to fill authorized units would be effected in accordance with law. The Regular Army Reserve, composed of young, highly trained, former Regular Army soldiers, is available to meet the immediate additional requirements of Regular Army units and of important installations. However, the number of Regular Army reservists is not sufficient to fill all initial war-time needs. Members of the National Guard and of the Enlisted Reserve Corps provide at once additional personnel of more or less training which may be expected to meet some of the remaining initial requirements. Provisions for enlisted personnel to fill to war strength the units of the Regular Army, the National Guard, and the Organized Reserve units are by volunteer enlistment combined with the Selective Training and Service Act.

History of Selective Service, or Conscription. In its modern sense, conscription dates from the French Revolution and hinges about the conception that every able-bodied man has the natural obligation to defend his hearth, home, and country against aggression. It affirms the principle of universal service without distinction of class or right of exemption by purchase. Many nations of modern Europe utilize the method for maintaining their armies during times of peace. Other nations, the United States among them, determine the method of personnel procurement, by the volunteer method or by conscription, in accordance with the laws passed by the civil government at the time the emergency arises.

Following the tremendous upheaval of the French Revolution in 1789, conscription was adopted as a means of providing for the immediate problems of the national defense which then, as now, so greatly concerned the French people. The initial system encountered serious objections with inadequate results, and it was not until 1793 that Carnot introduced a workable scheme which gained support. During the next few years the loss of vital productive energy resulting from requiring highly skilled civil workers to enter military service made itself felt. The main clauses of the system, which

became law in 1798 and made the Napoleonic conquests possible and influenced the subsequent course of European history, are as follows: "The young men in each Department were to be registered in five classes, the first consisting of those between twenty and twenty-one, and so on in an ascending scale to the last class, those between twenty-four and twenty-five. The conscripts each year were to be drawn from the first class, each subsequent class to be called out only in case the first did not furnish a sufficient number."

Napoleon carried the idea to great heights. During the period 1800-1813 he was furnished by France with a total of 2,613,000 men. In 1808, Prussia "definitely affirmed the principle of universal service without distinction of class or right of exemption by purchase." Prussia's greatness may be said to have developed out of their use of conscription. It led to the unification of the German people which was necessary for a united German Empire. The system reached its highest development during the period 1866-1870, enabling this nation to overcome all resistance which came before it.

In the World War, 1914-1918, conscription was followed by all the combatants.

Considering all of our wars, the United States has tended to choose the voluntary system. It has been fraught with many obvious difficulties. During the Revolution and the War of 1812 it failed to procure the numbers of men which were required. When this method was combined with short-term enlistments of a few months the difficulties of military operations became overpowering. Attempts were made to stimulate enlistment by offers of bounties in the form of money, land, and clothing. Massachusetts and Virginia, alone of all the colonies, adopted conscription in 1777. In the following year Washington addressed a letter to the Continental Congress in which he said, "I believe our greatest and only aid will be derived from drafting, which I trust may be done by the United States." Nevertheless, it was not done. During the War of 1812 Congress considered several proposals for conscription, but none was adopted. With the outbreak of the Civil War the volunteer system accomplished the requirements during 1861, but in 1862, following the call for 300,000 volunteers by the President, it collapsed. On March 3, 1863, the Enrollment Act was passed imposing upon the citizen a direct and personal obligation to the nation. It declared the liability of all males for military service, except certain exempted persons, between the ages of 20 and 45. This law was weakened by provisions for hiring substitutes. The quest for volunteers to avoid the draft continued with ever-increasing payment of bounties. Wealthy communities and individuals virtually bought out poorer districts. As a result of this maladministration riots broke out in New York City and elsewhere which forced the return of troops from the front to quell the disorders. The Confederate conscription of man power was enacted nearly a year before the system was adopted by the North.

Decision to rely upon conscription was decided upon promptly when the United States entered the World War. Mr. Newton D. Baker, able Secretary of War, had this to say in urging the passage of the Selective Service Act: "This is no time to tolerate uncertainty in the raising and the maintenance of the large numbers of men which the present emergency is likely to require nor uncertainty in the methods to be adopted for the establishment of an adequate efficient military service. The bill makes certain the raising and maintenance of the required forces with the utmost expedition. It establishes the principle that all arms-bearing citizens owe to the nation the duty of defending it. It selects only those who, by reason of their age and physical capacity, are best fitted to receive the training and withstand the actual hardship of campaign, and who, happily, can be taken with least disturbance of normal economic conditions." These regulations were written to avoid the mistakes which were made in the execution of conscription laws during the Civil War.

Registration was started on June 5, 1917, through the cooperation of state, city, and county governments. The initial registration included men between the ages of 21 and 30 years, over 10,000,000 being enrolled in a single day. Later the age bracket was changed to 18-45, and the enrolled men increased to 24,000,000. The process of selection was then instituted. Physical examinations, conditions as to type of employment, and nature of dependency were each considered. The enrolled men were then placed in four classes, the first including those who were to supply the initial reservoir of man power. A fifth class was completely exempted from military service by the terms of the Act. The order

in which individuals were called to the colors was then determined at Washington by a great central lottery. There was spotty opposition to the method during its consideration, but as soon as it became the law of the land the opposition soon died away; its wise administration and impartiality of operation became manifest. A total of 2,810,296 men were inducted into the Army through selective service. Approximately 2,000,000 others enlisted voluntarily although some of these, it is safe to say, did so in preference to the draft. For the first time in the history of the United States, despite its numerous wars, a war was entered with a workable procurement plan which stood the test of use. All of our citizens shared the liability of military service. The Army was provided with its requirements in man power by a steady controlled flow in accordance with its requirements and facilities. Industry and agriculture were disrupted only to the extent necessary to procure the needed strength, and essential industries were protected. The status of a drafted man's dependents were carefully considered according to a just and fair policy and, in appropriate cases, deferment or exemption was granted.

Definition of Terms Employed in Mobilization Planning. While this chapter neither purports to be a digest of the special mobilization plans of the United States, nor to explain their details in any way whatever, the following terms are defined to assist in their study.

Mobilization time (M-day). The date announced by the War Department as the first day of mobilization is designated as "M-day." The expression 60 M means 60 days after the initial mobilization date.

Corps Area Service Command. The agencies available to the corps area commander for the execution of his mobilization mission.

Concentration area. The locality in which troop units are assembled prior to active operations.

Reception center. An installation for the reception and care of newly procured man power, including the completion of all necessary records, the issue of individual equipment, classification as to occupation, assignment, and forwarding to units or other installations.

Processing. A collective term used to describe the several purposes which are accomplished in reception centers.

Mobilization point. The location of the initial mobilization of a unit.

Cadre. The group of trained individuals who occupy key positions in a newly mobilized unit and upon whom the commander relies for assistance during the initial stages of organization and training.

Unit training center. The location at which units are organized and trained during mobilization.

Replacement center. The location at which men are assembled for training and forwarding to existing units.

Replacement. An individual available for assignment to an organization.

Filler replacement. An individual designated to fill a vacancy not previously occupied, such as the raising of a peace-strength unit to war strength.

Loss replacement. An individual available to fill a vacancy which has been occupied and vacated.

Induction. The act of completing the entry of an individual into the military service as provided in law and regulations.

Limited Service Personnel. Men inducted into the military service who fail to meet the requirements of full or general duty but who may be used to advantage on limited tasks.

General Service Personnel. Men inducted into the military service who are considered to meet all requirements for full service.

Officer candidate. An individual selected for training with a view to appointment as an officer during the emergency.

Expansion Plans Initiated in 1940. Faced with potential hazards to the security of the Nation, the summer and early fall of 1940 brought defense legislation of the utmost importance to the United States. Its passage was a sharp break with tradition. Its

acceptance and loyal support by our people speaks mightily for their true realization of the hazard of world events. The Regular Army was authorized a strength of 375,000 enlisted men. Both the National Guard and members of the Officers' Reserve Corps were made available for call by the President, the Commander in Chief, for a year of training. Of first importance and the sharpest break with peacetime tradition was the passage, after long Congressional discussion, of the Selective Training and Service Act of 1940. Under this enactment more than sixteen million citizens, in age groups of 21 to 35, registered on October 16, 1940, for compulsory military training in time of peace. Five years earlier, even one year earlier, this tradition-shattering policy would have been opposed by vast sections of our people. Under the crashing impact of international events, the outcome of which no man can see, it has been accepted as necessary. The strength of a democracy now as always depends upon the ability of its citizens to reach sound decisions, acting upon them promptly and effectively. There can be no doubt in the mind of any person, or by any other nation, that the citizens of the United States stand ready, if need be, to defend their homes, their country, their way of life, their essential and vital interests whenever they may be seriously threatened. It is proven by their acceptance of the compulsory service legislation. It is an inspiring reaction.

But in acclaiming the advantages of the draft system, there is an unfortunate tendency to overlook and forget the services of those on volunteer status who have maintained through trying years their realization of the needs of the nation for trained military man power. These officers and men, citizens of the nation, devoted their time and energies to the problems of national defense during a period when the necessity was not understood by some and openly denounced by others. Their ranks include members of the Regular services, the Regular Army, Navy and Marines with their regular reserve elements: they include the National Guard, the members of the Organized Reserves, the Naval and Marine Reserves; and members of the Reserve Officers' Training Corps, both Army and Navy, and enrollees in the Citizens' Military Training Camps. During 1940 about 1,000,000 citizens received military training on volunteer status. During the World War over 2,000,000 American citizens were members of our armed services as volunteers. Selective service and compulsory military training is the best way and the only way which will stand the ultimate test. But the debt of gratitude which the nation owes its volunteers must not be forgotten. These citizens held high the torch of military preparedness during a period in which others found it easy to forget.

SELECTIVE TRAINING AND SERVICE ACT OF 1940

An act to provide for the common defense by increasing the personnel of the armed forces of the United States and providing for its training.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, that (A) the Congress hereby declares that it is imperative to increase and train the personnel of the armed forces of the United States.

(B) The Congress further declares that in a free society the obligations and privileges of military training and service should be shared generally in accordance with a fair and just system of selective compulsory military training and service.

(C) The Congress further declares, in accordance with our traditional military policy as expressed in the national defense act of 1916, as amended, that it is essential that the strength and organization of the National Guard, as an integral part of the first-line defenses of this nation, be at all times maintained and assured. To this end, it is the intent of the Congress that whenever the Congress shall determine that troops are needed for the national security in excess of those of the regular army and those in active training and service under Section 3 (B), the National Guard of the United States, or such part thereof as may be necessary, shall be ordered to active Federal service and continued therein so long as such necessity exists.

Sec. 2. Except as otherwise provided in this act, it shall be the duty of every male citizen of the United States, and of every male alien residing in the United States, who, on the day or days fixed for the first or any subsequent registration, is between the ages of twenty-one and thirty-six, to present himself for and submit to registration at such time or times and place or places, and in such manner and in such age group or groups, as shall be determined by rules and regulations prescribed hereunder.

Sec. 3. (A) Except as otherwise provided in this act, every male citizen of the United States, and every male alien residing in the United States who has declared his intention to become such a citizen, between the ages of twenty-one and thirty-six at the time fixed for his registration, shall be liable for training and service in the land or naval forces of the United States. The President is authorized from time to time, whether or not a state of war exists, to select and induct into the land and naval forces of the United States for training and service, in the manner provided in this act, such number of men as in his judgment is required for such forces in the national interest: Provided, that within the limits of the quota determined under Section 4 (B) for the subdivision in which he resides, any person, regardless of race or color, between the ages of eighteen and thirty-six, shall be afforded an opportunity to volunteer for induction into the land or naval forces of the United States for the training and service prescribed in subsection (B), but no person who so volunteers shall be inducted for such training and service so long as he is deferred after classification: Provided further, that no man shall be

inducted for training and service under this act unless and until he is acceptable to the land or naval forces for such training and service and his physical and mental fitness for such training and service has been satisfactorily determined: Provided further, that no men shall be inducted for such training and service until adequate provision shall have been made for such shelter, sanitary facilities, water supplies, heating and lighting arrangements, medical care and hospital accommodations, for such men, as may be determined by the Secretary of War or the Secretary of the Navy, as the case may be, to be essential to public and personal health: Provided further, that except in time of war there shall not be in active training or service in the land forces of the United States at any one time under Subsection (B) more than nine hundred thousand men and inducted under the provisions of this act. The men inducted into the land or naval forces for training and service under this act shall be assigned to camps or units of such forces.

(B) Each man inducted under the provisions of subsection (A) shall serve for a training and service period of twelve consecutive months, unless sooner discharged, except that whenever the Congress has declared that the national interest is imperilled, such twelve-month period may be extended by the President to such time as may be necessary in the interests of national defense.

(C) Each such man, after the completion of his period of training and service under subsection (B), shall be transferred to a reserve component of the land or naval forces of the United States; and until he attains the age of forty-five, or until the expiration of a period of ten years after such transfer, or until he is discharged from such reserve component, whichever occurs first, he shall be deemed to be a member of such reserve component and shall be subject to such additional training and service as may now or hereafter be prescribed by law: Provided, that any man who completes at least twelve months' training and service in the land forces under subsection (B), and who thereafter serves satisfactorily in the regular Army or in the active National Guard for a period of at least two years, shall, in time of peace, be relieved from any liability to serve in any reserve component of the land or naval forces of the United States and from further liability for the training and service under subsection (B), but nothing in this subsection shall be construed to prevent any such man, while in a reserve component of such forces, from being ordered or called to active duty in such forces.

(D) With respect to the men inducted for training and service under this act there shall be paid, allowed and extended the same pay, allowances, pensions, disability and death compensation and other benefits as are provided by law in the case of other enlisted men of like grades and length of service of that component of the land or naval forces to which they are assigned, and after transfer to a reserve component of the land or naval forces as provided in subsection (C) there shall be paid, allowed and extended with respect to them the same benefits as are provided by law in like cases with respect to other members of such reserve component. Men in such training and service and men who have been so transferred to reserve components shall have an opportunity to qualify for promotion.

(E) Persons inducted into the land forces of the United States under this act shall not be employed beyond the limits of the Western Hemisphere except in the territories and possessions of the United States, including the Philippine Islands.

(F) Nothing contained in this or any other act shall be construed as forbidding the payment of compensation by any person, firm or corporation to persons inducted in the land or naval forces of the United States for training and service under this act, or to members of the reserve components of such forces now or hereafter on any type of active duty, who, prior to their induction or commencement of active duty, were receiving compensation from such person, firm or corporation.

Sec. 4. (A) The selection of men for training and service under Section 3 (other than those who are voluntarily inducted pursuant to this act) shall be made in an impartial manner, under such rules and regulations as the President may prescribe, from the men who are liable for such training and service and who at the time of selection are registered and classified but not deferred or exempted; provided, that in the selection and training of men under this act, and in the interpretation and execution of the provisions of this act, there shall be no discrimination against any person on account of race or color.

(B) Quotas of men to be inducted for training and service under this act shall be determined for each state, territory and the District of Columbia, and for subdivisions thereof, on the basis of the actual number of men in the several states, territories and the District of Columbia, and the subdivisions thereof, who are liable for such training and service but who are not deferred after classification, except that credits shall be given in fixing such quotas for residents of such subdivisions who are in the land and naval forces of the United States on the date fixed for determining such quotas. After such quotas are fixed, credits shall be given in filling such quotas for residents of such subdivisions who subsequently become members of such forces. Until the actual numbers necessary for determining the quotas are known, the quotas may be based on estimates, and subsequent adjustments therein shall be made when such actual numbers are known. All computations under this subsection shall be made in accordance with such rules and regulations as the President may prescribe.

Sec. 5. (A) Commissioned officers, warrant officers, pay clerks, and enlisted men of the Regular Army, the Navy, the Marine Corps, the Coast Guard, the Coast and Geodetic Survey, the Public Health Service, the Federally recognized active National Guard, the Officers' Reserve Corp., the Regular Army Reserve, the enlisted Reserve Corps, the Naval Reserve and the Marine Corps Reserve; cadets, United States Military Academy; midshipmen, United States Naval Academy; cadets, United States Coast Guard Academy; men who have been accepted for admittance (commencing with the academic year next succeeding such acceptance) to the United States Military Academy as cadets, to the United States Naval Academy as midshipmen, or to the United States Coast Guard Academy as cadets, but only during the continuance of such acceptance; cadets of the advanced course, senior division, Reserve Officers' Training Corps or Naval Reserve Officers' Training Corps; and diplomatic representatives, technical attaches of foreign embassies and legations, consuls general, consuls, vice-consuls and consular agents of foreign countries, residing in the United States, who are not citizens of the United States, shall not be required to be registered under Section 2 and shall be relieved from liability for training and service under Section 3 (B).

(B) In time of peace, the following persons shall be relieved from liability to serve in any reserve component of the land or naval forces of the United States and from liability for training and service under Section 3 (B).

(1) Any man who shall have satisfactorily served for at least three consecutive years in the Regular Army before or after or partially before and partially after the time fixed for registration under Section 2.

(2) Any man who as a member of the active National Guard shall have satisfactorily served for at least one year in active Federal service in the Army of the United States, and subsequent

thereto for at least two consecutive years in the Regular Army or in the active National Guard, before or after or partially before and partially after the time fixed for registration under Section 2.

(3) Any man who is in the active National Guard at the time fixed for registration under Section 2, and who shall have satisfactorily served therein for at least six consecutive years, before or after or partially before and partially after the time fixed for such registration.

(4) Any man who is in the Officers' Reserve Corps on the eligible list at the time fixed for registration under Section 2, and who shall have satisfactorily served on the eligible list for at least six consecutive years, before or after or partially before and partially after the time fixed for such registration: provided, that nothing in this subsection shall be construed to prevent the persons enumerated in this subsection, while in reserve components of the land or naval forces of the United States, from being ordered or called to active duty in such forces.

(C) (1) The Vice-President of the United States, the Governors of the several states and territories, members of the legislative bodies of the United States and of the several states and territories, judges of the courts of record of the United States and of the several states and territories and the District of Columbia, shall, while holding such offices, be deferred from training and service under this act in the land and naval forces of the United States. (2) The President is authorized, under such rules and regulations as he may prescribe, to provide for the deferment from training and service under this act in the land and naval forces of the United States, of any person holding an office (other than an office described in paragraph (1) of this subsection) under the United States or any state, territory, or the District of Columbia, whose continued service in such office is found in accordance with Section 10 (A) (2) to be necessary to the maintenance of the public health, safety, or interest.

(D) Regular or duly ordained ministers of religion and students who are preparing for the ministry in theological or divinity schools recognized as such for more than one year prior to the date of enactment of this act, shall be exempt from training and service (but not from registration) under this act.

(E) The President is authorized, under such rules and regulations as he may prescribe, to provide for the deferment from training and service under this act in the land and naval forces of the United States of those men whose employment in industry, agriculture, or other occupations or employment, or whose activity in other endeavors, is found in accordance with Section 10 (A) (2) to be necessary to the maintenance of the national health, safety, or interest. The President is also authorized, under such rules and regulations as he may prescribe, to provide for the deferment from training and service under this act in the land and naval forces of the United States (1) of those men in a status with respect to persons dependent upon them for support which renders their deferment advisable, and (2) of those men found to be physically, mentally, or morally deficient or defective. No deferment from such training and service shall be made in the case of any individual except upon the basis of the status of such individual, and no such deferment shall be made of individuals by occupational groups or of groups of individuals in any plant or institution.

(F) Any person who, during the year 1940, entered upon attendance for the academic year 1940-1941—

(1) At any college or university which grants a degree in arts or science, to pursue a course of instruction satisfactory completion of which is prescribed by such college or university as a prerequisite to either of such degrees; or

(2) At any university described in Paragraph (1), to pursue a course of instruction to the pursuit of which a degree in arts or science is prescribed by such university as a prerequisite; and who, while pursuing such course of instruction at such college or university, is selected for training and service under this act prior to the end of such academic year, or prior to July 1, 1941, whichever occurs first, shall, upon his request, be deferred from induction into the land or naval forces for such training and service until the end of such academic year, but in no event later than July 1, 1941.

(G) Nothing contained in this act shall be construed to require any person to be subject to combat training and service in the land and naval forces of the United States who, by reason of religious training and belief, is conscientiously opposed to participation in war in any form. Any such person claiming such exemption from combatant training and service because of such conscientious objections whose claim is sustained by the local board shall, if he is inducted into the land or naval forces of this act, be assigned to noncombatant service as defined by the President, or shall, if he is found to be conscientiously opposed to participation in such noncombatant service, in lieu of such induction, be assigned to work of national importance under civilian direction. Any such person claiming such exemption from combatant training and service because of such conscientious objections shall, if such claim is not sustained by the local board, be entitled to an appeal to the appropriate appeal board provided for in Section 10 (A) (2). Upon the filing of such appeal with the appeal board, the appeal board shall forthwith refer the matter to the Department of Justice for inquiry and hearing by the department of the proper agency thereof. After appropriate inquiry by such agency, a hearing shall be held by the Department of Justice with respect to the character and good faith of the objections of the person concerned, and such person shall be notified of the time and place of such hearing. The department shall, after such hearing, if the objections are found to be sustained, recommend to the appeal board (1) that if the objector is inducted into the land or naval forces under this act, he shall be assigned to noncombatant service as defined by the President, or (2) that if the objector is found to be conscientiously opposed to participation in such noncombatant service, he shall in lieu of such induction be assigned to work of national importance under civilian direction. If after such hearings the department finds that his objections are not sustained, it shall recommend to the appeal board that such objections be not sustained. The appeal board shall give consideration to but shall not be bound to follow the recommendation of the Department of Justice together with the record on appeal from the local board in making its decision. Each person whose claim for exemption from combatant training and service because of conscientious objections is sustained shall be listed by the local board on a register of conscientious objectors.

(H) No exception from registration, or exemption or deferment from training and service, under this act, shall continue after the cause therefor ceases to exist.

Sec. 6. The President shall have authority to induct into the land and naval forces of the United States under this act no greater number of men than the Congress shall hereafter make specific appropriation for from time to time.

Sec. 7. No bounty shall be paid to induce any person to enlist in or be inducted into the land or naval forces of the United States: provided, that the clothing or enlistment allowances authorized by law shall not be regarded as bounties within the meaning of this section. No person liable for service in such forces shall be permitted or allowed to furnish a substitute for such service; no substitute as such shall be received, enlisted, enrolled, or inducted into the

land or naval forces of the United States; and no person liable for training and service in such forces under Section 3 shall be permitted to escape such training and service or be discharged therefrom prior to the expiration of his period of such training and service by the payment of money or any other valuable thing whatsoever as consideration for his release from such training and service or liability therefor.

Sec. 8. (A) Any person inducted into the land or naval forces under this act for training and service, who, in the judgment of those in authority over him, satisfactorily completes his period of training and service under Section 3 (B) shall be entitled to a certificate to that effect upon the completion of such period of training and service, which shall include a record of any special proficiency or merit attained. In addition, each such person who is inducted into the land or naval forces under this act for training and service shall be given a physical examination at the beginning of such training and service and a medical statement showing any physical defects noted upon such examination; and upon the completion of his period of training and service under Section 3 (B), each such person shall be given another physical examination and shall be given a medical statement showing any injuries, illnesses or disabilities suffered by him during such period of training and service.

(B) In the case of any such person who, in order to perform such training and service, has left or leaves a position, other than a temporary position, in the employ of any employer and who (1) receives such certificate, (2) is still qualified to perform the duties of such position, and (3) makes application for re-employment within forty days after he is relieved from such training and service—

(a) If such position was in the employ of the United States government, its territories or possessions, or the District of Columbia, such person shall be restored to such position or to a position of like seniority, status and pay;

(b) If such position was in the employ of a private employer, such employer shall restore such person to such position or to a position of like seniority, status and pay unless the employer's circumstances have so changed as to make it impossible or unreasonable to do so;

(c) If such position was in the employ of any state or political subdivision thereof, it is hereby declared to be the sense of the Congress that such person should be restored to such position or to a position of any like seniority, status and pay.

(C) Any person who is restored to a position in accordance with the provisions of paragraph (a) or (b) of subsection (B) shall be considered as having been on furlough or leave of absence during his period of training and service in the land or naval forces, shall be so restored without loss of seniority, shall be entitled to participate in insurance or other benefits offered by the employer pursuant to established rules and practices relating to employees on furlough or leave of absence in effect with the employer at the time such person was inducted into such forces and shall not be discharged from such position without cause within one year after such restoration.

(D) Section 3 (c) of the joint resolution entitled "joint resolution to strengthen the common defense and to authorize the President to order members and units of reserve components and retired personnel of the regular army into active military service," approved 27 Aug. 1940, is amended to read as follows:

"(C) Any person who is restored to a position in accordance with the provisions of paragraph (a) or (b) of subsection (b) shall be considered as having been on furlough or leave of absence during his period of active military service, shall be so restored without loss of seniority, shall be entitled to participate in insurance or other benefits offered by the employer pursuant to established rules and practices relating to employees on furlough or leave of absence in effect with the employer at the time such person was ordered into active service, and shall not be discharged from such position without cause within one year after such restoration."

(E) In case any private employer fails or refuses to comply with the provisions of subsection (b) or subsection (c), the district court of the United States for the district in which such private employer maintains a place of business shall have power, upon the filing of a motion, petition, or other appropriate pleading by the person entitled to the benefits of such provisions, to specifically require such employer to comply with such provisions, and, as an incident thereto, to compensate such person for any loss of wages or benefits suffered by reason of such employer's unlawful action. The court shall order a speedy hearing in any such case and shall advance it on the calendar. Upon application to the United States District Attorney or comparable official for the district in which such private employer maintains a place of business, by any person claiming to be entitled to the benefits of such provisions, such United States District Attorney or official, if reasonably satisfied that the person so applying is entitled to such benefits, shall appear and act as attorney for such person in the amicable adjustment of the claim or in the filing of any motion, petition, or other appropriate pleading and the prosecution thereof to specifically require such employer to comply with such provisions: provided, that no fees or court costs shall be taxed against the persons so applying for such benefits.

(F) Section 3 (D) of the joint resolution entitled "joint resolution to strengthen the common defense and to authorize the President to order members and units of reserve components and retire personnel of the regular army into active military service," approved 27 Aug. 1940, is amended by inserting before the period at the end of the first sentence the following: ", and, as an incident thereto, to compensate such person for any loss of wages or benefits suffered by reason of such employer's unlawful action."

(G) The director of selective service herein provided for shall establish a personnel division with adequate facilities to render aid in the replacement in their former positions of, or in securing positions for members of the reserve components of the land and naval forces of the United States who have satisfactorily completed any period of active duty, and persons who have satisfactorily completed any period of their training and service under this act.

(H) Any person inducted into the land or naval forces for training and service under this act shall, during the period of such training and service, be permitted to vote in person or by absentee ballot in any general, special, or primary election occurring in the state of which he is a resident, whether he is within or outside of such state at the time of such election, if under the laws of such state he is entitled so to vote in such election; but nothing in this subsection shall be construed to require granting to any such person a leave of absence for longer than one day in order to permit him to vote in person in any such election.

(I) It is the expressed policy of the Congress that whenever a vacancy is caused in the employment rolls of any business or industry by reason of induction into the service of the United States of an employee pursuant to the provisions of this act such vacancy shall not be filled by any person who is a member of the Communist party or the German-American Bund.

Sec. 9. The President is empowered, through the head of the War Department or the Navy Department of the government, in addition to the present authorized methods of purchase or procurement, to place an order with any individual, firm, association, company, corporation, or

organized manufacturing industry for such product or material as may be required, and which is of the nature and kind usually produced or capable of being produced by such individual, firm, company, association, corporation, or organized manufacturing industry.

Compliance with all such orders for products or material shall be obligatory on any individual, firm, association, company, corporation or organized manufacturing industry or the responsible head or heads thereof, and shall take precedence over all other orders and contracts theretofore placed with such individual, firm, company, association, corporation or organized manufacturing industry, and any individual, firm, association, company or organized manufacturing industry or the responsible head or heads thereof owning or operating any plant equipped for the manufacture of arms or ammunition or parts of ammunition, or any necessary supplies or equipment for the Army or Navy, and any individual, firm, association, company, corporation or organized manufacturing industry or the responsible head or heads thereof owning or operating any manufacturing plant which, in the opinion of the Secretary of War or the Secretary of the Navy shall be capable of being readily transformed into a plant for the manufacture of arms or ammunitions, or parts thereof, or other necessary supplies or equipment, who shall refuse to give to the United States such preference in the matter of execution of orders, or who shall refuse to manufacture the kind, quantity or quality of arms or ammunition, or the parts thereof, or any necessary supplies or equipment, as ordered by the Secretary of War or the Secretary of the Navy, or who shall refuse to furnish such arms, ammunition or parts of ammunition, or other supplies or equipment, at a reasonable price as determined by the Secretary of War or the Secretary of the Navy, as the case may be, then, and in either such case, the President, through the head of the War or Navy Departments of the government, in addition to the present authorized methods of purchase or production, is hereby authorized to take immediate possession of any such plant or plants, and through the appropriate branch, bureau or department of the Army or Navy to manufacture therein such product or material as may be required, and any individual, firm, company, association or corporation, or organized manufacturing industry, or the responsible head or heads thereof, failing to comply with the provisions of this section shall be deemed guilty of a felony, and upon conviction shall be punished by imprisonment for not more than three years and a fine of not exceeding \$50,000.

The compensation to be paid to any individual, firm, company, association, corporation or organized manufacturing industry for its products or material, or as rental for use of any manufacturing plant while used by the United States shall be fair and just: Provided, that nothing herein shall be deemed to render inapplicable existing state or Federal laws concerning the health, safety, security and employment standards of the employees in such plant.

The first and second provisions in Section 8 (B) of the act entitled "An act to expedite national defense, and for other purposes," approved 28 June 1940 (public act numbered 671, seventy-sixth Congress), are hereby repealed.

Sec. 10. (A) The President is authorized—

(1) To prescribe the necessary rules and regulations to carry out the provisions of this act:
(2) To create and establish a selective service system, and shall provide for the classification of registrants and of persons who volunteer for induction, under this act, on the basis of availability for training and service, and shall establish within the selective service system civilian local boards and such other civilian agencies, including appeal boards and agencies of appeal, as may be necessary to carry out the provisions of this act. There shall be created one or more local boards in each county or political subdivision corresponding thereto of each state, territory, and the District of Columbia.

Each local board shall consist of three or more members to be appointed by the President, from recommendations made by the respective Governors or comparable executive officials. No member of any such local board shall be a member of the land or naval forces of the United States, but each member of any such local board shall be a civilian who is a citizen of the United States residing in the county or political subdivision corresponding thereto in which such local board has jurisdiction under rules and regulations prescribed by the President. Such local boards, under rules and regulations prescribed by the President, shall have power within their respective jurisdictions to hear and determine, subject to the right of appeal to the appeal boards herein authorized, all questions or claims with respect to inclusion for, or exemption of, deferment from, training and service under this act of all individuals within the jurisdiction of such local boards.

Decisions of such local board shall be final except where an appeal is authorized in accordance with such rules and regulations as the President may prescribe. Appeal boards and agencies of appeal within the selective service system shall be composed of civilians who are citizens of the United States. No person who is an officer, member, agent or employee of the selective service system, or of any such local or appeal board or other agency, shall be exempted from registration, or deferred from training and service, as provided for in this act, by reason of his status as such officer, member, agent or employee.

(3) To appoint by and with the advice and consent of the Senate, and fix the compensation at a rate not in excess of \$10,000 per annum, of a director or selective service who shall be directly responsible to him and to appoint and fix the compensation of such other officers, agents and employees as he may deem necessary to carry out the provisions of this act: provided, that any officer on the active or retired list of the Army, Navy, Marine Corps or Coast Guard, or of any reserve component thereof or any officer or employee of any department or agency of the United States who may be assigned or detailed to any office or position to carry out the provisions of this act except to offices or positions on local boards, appeal boards, or agencies of appeal established or created pursuant to Section 10 (A) (2) may serve in and perform the functions of such office or position without loss of or prejudice to his status as such officer in the Army, Navy, Marine Corps, or Coast Guard or reserve component thereof, or as such officer or employee in any department or agency of the United States; provided further that any person so appointed, assigned, or detailed to a position, the compensation in respect of which is at a rate in excess of \$5,000 per annum shall be appointed, assigned or detailed by and with the advice and consent of the Senate: provided further that the President may appoint necessary clerical and stenographic employees for local boards and fix their compensation without regard to the classification act of 1923, as amended, and without regard to the provisions of civil service laws.

(4) To utilize the services of any or all departments and any and all officers or agents of the United States and to accept the services of all officers and agents of the several states, territories and the District of Columbia and subdivisions thereof, in the execution of this act; and

(5) To purchase such printing, binding and blankbook work from public, commercial or private printing establishments or binderies upon orders placed by the Public Printer or upon waivers issued in accordance with Section 12 of the printing act approved 12 Jan. 1895, as amended by the act of 8 July 1935 (49 Stat. 475) and to obtain by purchase, loan or gift such equipment and supplies for the selective service system as he may deem necessary to carry out the provisions of this act, with or without advertising or formal contract; and

(6) To prescribe eligibility, rules and regulations governing the parole for service in the land or naval forces, or for any other special service established pursuant to this act, or of any person convicted of a violation of any of the provisions of this act.

(B) The President is further authorized, under such rules and regulations as he may prescribe, to delegate and provide for the delegation of any authority vested in him under this act to such officers, agents or persons as he may designate or appoint for such purposes or as may be designated or appointed for such purpose pursuant to such rules and regulations as he may prescribe.

(C) In the admission of this act voluntary services may be accepted. Correspondence necessary in the execution of this act may be carried in official penalty envelopes.

(D) The chief of finance, United States Army, is hereby designated, empowered and directed to act as the fiscal, disbursing and accounting agent of the director of selective service in carrying out the provisions of this act.

Sec. 11. Any person charged as herein provided with the duty of carrying out any of the provisions of this act, or the rules or regulations made or directions given thereunder, who shall knowingly fail or neglect to perform such duty, and any person charged with such duty, or having and exercising any authority under said act, rules, regulations or directions who shall knowingly make, or be a party to the making of any false, improper or incorrect registration, classification, physical or mental examination, deferment, induction, enrollment or muster, and any person who shall knowingly make, or be a party to the making of, any false statement or certificate as to the fitness or unfitness or liability or non-liability of himself or any other person for service under the provisions of this act, or rules, regulations or directions made pursuant thereto, or who otherwise evades registration or service in the land or naval forces or any of the requirements of this act, or who knowingly counsels, aids or abets another to evade registration or service in the land or naval forces or any of the requirements of this act, or of said rules, regulations or directions, or who in any manner shall knowingly fail or neglect to perform any duty required of him under or in the execution of this act, or rules or regulations made pursuant to this act, or any person or persons who shall knowingly hinder or interfere in any way by force or violence with the administration of this act or the rules or regulations made pursuant thereto, or conspire to do so, shall, upon conviction in the District Court of the United States having jurisdiction thereof, be punished by imprisonment for not more than five years or a fine of not more than \$10,000, or by both such fine and imprisonment, or if subject to military or naval law may be tried by court martial and, on conviction, shall suffer such punishment as a court martial may direct. No person shall be tried by any military or naval court martial in any case arising under this act unless such person has been actually inducted for the training and service prescribed under this act or unless he is subject to trial by court martial under laws in force prior to the enactment of this act. Precedence shall be given by courts to the trial of cases arising under this act.

Sec. 12. (A) The monthly base pay of enlisted men of the Army and the Marine Corps shall be as follows: Enlisted men of the first grade, \$126; enlisted men of the second grade, \$84; enlisted men of the third grade, \$72; enlisted men of the fourth grade, \$60; enlisted men of the fifth grade, \$54; enlisted men of the sixth grade, 36; enlisted men of the seventh grade \$30; except that the monthly base pay of enlisted men with less than four months' service during their first enlistment period and of enlisted men of the seventh grade whose inefficiency or other unfitness has been determined under regulations prescribed by the Secretary of War and the Secretary of the Navy, respectively, shall be \$21.

The pay for specialist's ratings, which shall be in addition to monthly base pay, shall be as follows: First class, \$30; second class, \$25; third class, \$20; fourth class, \$15; fifth class, \$6; sixth class, \$3. Enlisted men of the Army and the Marine Corps shall receive, as a permanent addition to their pay an increase of 10 per centum of their base pay and pay for specialists' rating upon completion of their first four years of service and an additional increase of 5 per centum of such base pay and pay for specialists' rating for each four years of service thereafter, but the total of such increases shall not exceed 25 per centum. Enlisted men of the Navy shall be entitled to receive at least the same pay and allowances as are provided for enlisted men in similar grades in the Army and Marine Corps.

(B) The pay for specialist's rating received by an enlisted man of the Army or Marine Corps at the time of his retirement shall be included in the computation of his retired pay.

(C) The pay of enlisted men of the sixth grade of the National Guard for each armory drill period, and for each day of participation in exercises under sections 94, 97 and 99 of the national defense act, shall be \$1.20.

(D) No back pay or allowances shall be accrued by reason of this act for any period prior to 1 Oct. 1940.

(E) Nothing in this act shall operate to reduce the pay now being received by any enlisted man.

(F) The provisions of this section shall be effective on and after 1 Oct. 1940. Thereafter all laws and parts of laws insofar as the same are inconsistent herewith or in conflict with the provisions hereof are hereby repealed.

Sec. 13 (A) The benefits of the soldiers and sailors civil relief act, approved 8 March 1918, are hereby extended to all persons inducted into the land or naval forces now or hereafter on active duty for a period of more than one month; and, except as hereinafter provided, the provisions of such act of 8 March 1918, shall be effective for such purposes.

(B) For the purposes of this section—

(1) The following provisions of such act of 8 March 1918, shall be inoperative: Section 100; paragraphs (1), (2) and (5) of Section 101; Article 4; Article 5; paragraph (2) of Section 601; and Section 603;

(2) The term "persons in military service" when used in such act of 8 March 1918, shall be deemed to mean persons inducted into the land or naval forces under this act and all members of any reserve component of such forces now or hereafter on active duty for a period of more than one month;

(3) The term "period of military service," when used in such act of 8 March 1918, when applicable with respect to any such person, shall be deemed to mean the period beginning with the date of enactment of this act, or the date on which such person is inducted into such forces under this act for any period of training and service or is ordered to such active duty whichever is the later, and ending sixty days after the date on which such period of training and service or active duty terminates.

(4) The term "date of approval of this act," when used in such act of 8 March 1918, shall be deemed to mean the date of enactment of the Selective Training and Service Act of 1940.

(C) Article III of such act of 8 March 1918, is amended by adding at the end therefore the following new section:

"Sec. 303. Nothing contained in section 301 shall prevent the termination or cancellation

of a contract referred to in such section, nor the repossession or retention of property purchased or received under such contract, pursuant to a mutual agreement of the parties thereto, or their assignee's, if such agreement is executed in writing subsequent to the making of such contract and during the period of military service of the person concerned."

Sec. 14 (A). Every person shall be deemed to have notice of the requirements of this act upon publication by the President of a proclamation of other public notice fixing a time for any registration under Section 2.

(B) If any provision of this act, or the application thereof to any person or circumstance, is held invalid, the remainder of the act, and the application of such provision to other persons or circumstances, shall not be affected thereby.

(C) Nothing contained in this act shall be construed to repeal, amend, or suspend the laws now in force authorizing voluntary enlistment or re-enlistment in the land and naval forces of the United States, including the reserve components thereof.

Sec. 15. When used in this act—

(A) The term "between the ages of twenty-one and thirty-six" shall refer to men who have attained the twenty-first anniversary of the day of their birth and who have not attained the thirty-sixth anniversary of the day of their birth, and other terms designating different age groups shall be construed in a similar manner.

(B) The term "United States," when used in a geographical sense, shall be deemed to mean the several states, the District of Columbia, Alaska, Hawaii and Puerto Rico.

(C) The term "dependent" when used with respect to a person registered under the provisions of this act includes only an individual (1) who is dependent in fact on such person for support in a reasonable manner and (2) whose support in such a manner depends on income earned by such person in a business, occupation or employment.

(D) The terms "land or naval forces" and "land and naval forces" shall be deemed to include aviation units of such forces.

(E) The term "district court of the United States" shall be deemed to include the courts of the United States for the territories and the possessions of the United States.

Sec. 16 (A) Except as provided in this act, all laws and parts of laws in conflict with the provisions of this act are hereby suspended to the extent of such conflict for the period in which this act shall be in force.

(B) All the provisions of this act, except the provisions of Sections 3 (C), 3 (D), 8 (G) and 12, shall become inoperative and cease to apply on and after 15 May 1945, except as to offenses committed prior to such date, unless this act is continued in effect by the Congress.

(C) There are hereby authorized to be appropriated, out of any money in the Treasury not otherwise appropriated, such sums as may be necessary to carry out the provisions of this act.

Sec. 17. This act shall take effect immediately.

Sec. 18. This act may be cited as the "selective training service act of 1940."

THE PRESIDENT'S DRAFT PROCLAMATION

Whereas the Congress has enacted and I have this day approved the Selective Training and Service Act of 1940, which declares that it is imperative to increase and train the personnel of the armed forces of the United States and that in a free society the obligations and privileges of military training and service should be shared generally in accordance with a fair and just system of selective compulsory military training and service; and

Whereas the said act contains, in part, the following provisions:

(Here the President quoted Section 2, Section 5(a), Section 10(a), and Section 14(a) of the Selective Service Act.)

Now, therefore, I, Franklin D. Roosevelt, President of the United States of America, under and by virtue of the authority vested in me by the aforesaid Selective Training and Service Act of 1940, do proclaim the following:

1. The first registration under the Selective Training and Service Act of 1940 shall take place on Wednesday, the 16th day of October, 1940, between the hours of 7 a. m. and 9 p. m.

2. Every male person (other than persons excepted by Section 5(a) of the aforesaid act) who is a citizen of the United States or an alien residing in the United States and who, on the registration date fixed herein, has attained the 21st anniversary of the day of his birth and has not attained the 36th anniversary of the day of his birth, is required to present himself for and submit to registration. Every such person who is within the Continental United States on the registration date fixed herein shall on that date present himself for and submit to registration at the duly designated place of registration within the precinct, district, or registration area in which he has his permanent home or in which he may happen to be on that date. Every such person who is not within the Continental United States on the registration date fixed herein shall within five days after his return to the Continental United States present himself for and submit to registration. Regulations will be prescribed hereafter providing for special registration of those who on account of sickness or other causes beyond their control are unable to present themselves for registration at the designated places of registration on the registration date fixed herein.

3. Every person subject to registration is required to familiarize himself with the rules and regulations governing registration and to comply therewith.

4. The times and places for registration in Alaska, Hawaii and Puerto Rico will be fixed in subsequent proclamations.

5. I call upon the Governors of the several States and the Board of Commissioners of the District of Columbia to provide suitable and sufficient places of registration within their respective jurisdictions and to provide suitable and necessary registration boards to effect such registration.

6. I further call upon all officers and agents of the United States and all officers and agents of the several States and the District of Columbia and subdivisions thereof to do and perform all acts and services necessary to accomplish effective and complete registration; and I especially call upon all local election officials and other patriotic citizens to offer their services as members of the Boards of Registration.

7. In order that there may be full cooperation in carrying into effect the purposes of said act, I urge all employers and Government agencies of all kinds—Federal, State and local—to give those under their charge sufficient time off in which to fulfill the obligation of registration incumbent on them under the said act.

America stands at the cross roads of its destiny. Time and distance have been shortened. A few weeks have seen great nations fall. We cannot remain indifferent to the philosophy of force now rampant in the world. The terrible fate of nations whose weakness invited attack is too well known to us all.

We must and will marshal our potential strength to fend off war from our shores. We must and will prevent our land from becoming a victim of aggression.

Our decision has been made.

It is in that spirit that the people of our country are assuming the burdens that now become necessary. Offers of service have flooded in from patriotic citizens in every part of the Nation, who ask only what they can do to help. Now there is both the opportunity and the need for many thousands to assist in listing the names and addresses of the millions who will enroll on registration day at school houses, polling places and town halls.

The Congress has debated without partisanship and has now enacted a law establishing a selective method of augmenting our armed forces. The method is fair, it is sure, it is democratic—it is the will of our people.

After thoughtful deliberation, and as the first step, our young men will come from the factories and the fields, the cities and the towns, to enroll their names on registration day.

On that eventful day my generation will salute their generation. May we all renew within our hearts that conception of liberty and that way of life which we have all inherited. May we all strengthen our resolve to hold high the torch of freedom in this darkening world so that our children and their children may not be robbed of their rightful inheritance.

In witness whereof I have hereunto set my hand and caused the seal of the United States to be affixed.

Done at the City of Washington this sixteenth day of September in the year of our Lord nineteen hundred and forty, and of the independence of the United States of America the one hundred and sixty-fifth.

(Seal) FRANKLIN D. ROOSEVELT.

By the President:

CORDELL HULL,

Secretary of State.

ENACTMENT FOR ORDERING MEMBERS AND UNITS OF RESERVE COMPONENTS AND RETIRED PERSONNEL OF THE REGULAR ARMY INTO ACTIVE MILITARY SERVICE

To strengthen the common defense and to authorize the President to order members and units of reserve components and retired personnel of the Regular Army into active military service.

Resolved by the Senate and House of Representatives of the United States of America in Congress assembled, That during the period ending 30 June 1942, the President be, and is hereby, authorized from time to time to order into the active military service of the United States for a period of twelve consecutive months each, any or all members and units of any or all reserve components of the Army of the United States—except that any person in the National Guard of the United States under the age of 18 years so ordered into the active military service shall be immediately issued an honorable discharge from the National Guard of the United States and retired personnel of the Regular Army, with or without their consent, to such extent and in such manner as he may deem necessary for the strengthening of the national defense: Provided, That the members and units of the reserve components of the Army of the United States ordered into active Federal service under this authority shall not be employed beyond the limits of the Western Hemisphere except in the Territories and possessions of the United States, including the Philippine Islands.

Sec. 2. All National Guard, Reserve, and retired personnel ordered into the active military service of the United States under the foregoing authority, shall from the dates on which they are respectively required by such order to report for duty in such service, be subject to the respective laws and regulations relating to enlistments, reenlistments, employment, conduct, rights, and privileges, and discharge of such personnel in such service to the same extent in all particulars as if they had been ordered into such service under existing general statutory authorizations.

Sec. 3. (a) Any member of any reserve component of the land or naval forces who is on active duty or who may be assigned to active duty and who, in the judgment of those in authority over him, satisfactorily completes such active duty, and any person so ordered into active military service of the United States who, in the judgment of those in authority over him, satisfactorily completes the period of service required under this joint resolution, shall be entitled to a certificate to that effect upon the completion of such active duty or such period of service, which shall include a record of any special proficiency or merit attained.

In addition, each such person who is assigned to such active duty or ordered into such active military service shall be given a physical examination at the beginning of such active duty or service and a medical statement showing any physical defects noted upon such examination; and upon the completion of the period of such active duty or service, each such person shall be given another physical examination and shall be given a medical statement showing any injuries, illnesses or disabilities suffered by him during such period of active duty or service.

(b) In the case of any such person who in order to perform such active duty or such service, has left or leaves a position, other than a temporary position, in the employ of any employer and who (1) receives such certificate, (2) is still qualified to perform the duties of such position, and (3) makes application for reemployment within forty days after he is relieved from such service, active duty or—

(A) if such position was in the employ of the United States Government, its Territories or possessions, or the District of Columbia, such person shall be restored to such position or to a position of like seniority status and pay;

(B) if such position was in the employ of a private employer, such employer shall restore such person to such position or to a position of like seniority status and pay unless the employer's circumstances have so changed as to make it impossible or unreasonable to do so;

(C) if such position was in the employ of any State or political subdivision thereof it is hereby declared to be the sense of the Congress that such person should be restored to such position or to a position of like seniority status and pay.

(c) Any person who is restored to a position in accordance with the provisions of paragraphs (A) or (B) or subsection (b) shall be so restored without loss of seniority, insurance participation or benefits, or other benefits, and such persons shall not be discharged from such position without cause within one year after such restoration period.

(d) In case any private employer fails or refuses to comply with provisions of subsection (b) or subsection (c), the district court of the United States for the district in which such private employer maintains a place of business shall have power, upon the filing of a motion, petition, or other appropriate pleading by the person entitled to the benefits of such provisions to specifically require such employer to comply with such provisions. The court shall order a speedy hearing in any such case and shall advance it on the calendar. Upon application to the United States District Attorney for the district in which such private employer maintains a place of business, by any person claiming to be entitled to the benefits of such provisions, such United States District Attorney, if reasonably satisfied that the person so applying is entitled to such benefit, shall appear and act as attorney for such person in the amicable adjustment

of the claim or in the filing of any motion, petition or other appropriate pleading and the prosecution thereof to specifically require such employer to comply with such provisions: provided, that no fees or court costs shall be taxed against the person so applying for such benefits.

(e) Any member of any reserve component of the Army of the United States below the rank of Captain who is ordered into the active military service of the United States pursuant to this joint resolution, who has any person or persons solely dependent upon him for support, and who has no other means of support except the wages, salary or other compensation for personal services that he earns, may resign or shall be discharged upon his own request made within 20 days of his entry into such active military service.

Sec. 4. (a) The benefits of the Soldiers and Sailors Civil Relief Act, approved 8 March 1918, are hereby extended to all National Guard, Reserve, and retired personnel ordered into the active military service under authority of this joint resolution, so long as such personnel are in such service and for sixty days thereafter, and except as hereinafter provided, the provisions of such Act shall be effective for such purposes.

(b) For the purposes of this section—

(1) the following provisions of such Act of 8 March 1918, shall be inoperative: Section 100; and paragraphs (1), (2), and (5) of section 101; article 4; article 5; paragraph (2) of section 601; and section 603.

(2) the term "persons in military service," when used in such Act, shall be deemed to mean persons ordered into the active military service under the authority of this joint resolution.

(3) the term "period of military service," when used in such Act, when applicable with respect to any person, shall be deemed to mean the period beginning with the date on which such person is ordered into such active military service and ending with the date on which he is relieved from such service.

Sec. 5. All laws and parts of laws in conflict herewith are hereby suspended to the extent that they may be in conflict with any provision hereof.

CHAPTER III

TACTICAL FUNCTIONS OF THE ARMS

INTRODUCTION

The student of the tactical employment of large military forces must acquire a clear understanding of the function of each of the several components. Only in this manner may he envision the complete function of his own arm or service in all of the conditions imposed by combat. An army is a carefully integrated organization of all required functions, the needs for which can be foreseen and provided for in advance. No one of these functional components wins battles alone. The combined, joint action of all is essential for success. For these reasons large military forces, such as the division, corps, and field army, consist of "arms," the units which engage directly in combat, and "services" which provide the required administration, supply, evacuation, and hospitalization. Each of these components is given the necessary personnel to execute its mission. This personnel is organized into units for control and efficient operation. Each component is provided with essential equipment including transportation which it will require. Doctrines and principles announced by the War Department are then applied. In battle, the commander assigns a mission or objective for the whole force and a specific task to each of its several components to achieve its accomplishment. He then coordinates and directs the action of all to achieve the ends sought. The student must learn *what* each arm and service is required to do, and then he may proceed to acquire an understanding of *when, where, and how* it is to do it.

It is particularly desirable that the officer of each of the several corps of the Medical Department possess this broad understanding. He serves and works with each arm and service. In garrison, camp, or bivouac, on the march, in battle and campaign, in success or failure, he accompanies the fighting force with his medical unit to provide, wherever his humanitarian services may be needed, medical attendance for the sick, the injured, or wounded, as well as facilities for evacuation and hospitalization. There is no single factor so destructive of the morale of fighting men as the suspicion or knowledge that the sick or wounded are being inadequately attended. In our army, medical units are an integral part of the tactical structure. The plan for any projected military operation must include a medical plan. Its preparation will fall to the medical officer. It is a doctrine that the medical plan must provide adequate support for the tactical plan, however difficult this task may be. In the execution of this mission he will make judicious use of the means in medical personnel, equipment, and transportation which are available to him. He will allot these means to units in accordance with their needs, place them where they can perform their tasks with greatest effectiveness, and move them as the supported units move, in order that continuous medical service may be provided. These are the tasks which pertain to the medical officer. If he is to perform them to the standard he will wish to attain he must possess a considerable knowledge of the functions, battle tasks, and methods of operation of each component of an army.

In addition to a discussion of each of the arms with their tactical employment, this chapter contains the elements of *camouflage* and *scouting and patrolling*. Useful information on communications applicable to all arms and services is included in the discussion of the Signal Corps.

INFANTRY

Mission. Infantry is the arm of close combat. In the attack it advances upon the enemy, then closes with him to effect his destruction or capture. In the defense, infantry holds the positions to which it is assigned, checks the advance of the enemy, and throws him back by counterattack. As the arm which is charged with the principal mission in battle, the mission of the infantry becomes the mission of the entire command. The other arms and the services which are present have as their battle functions the duty of assisting the infantry, enabling it to achieve a victory which, unaided, would be beyond its powers, or to enable it to gain its objectives with fewer casualties or in a shorter time.

Infantry carries out its mission by fire action, movement, and shock action. The fire of

infantry weapons is to inflict losses on the enemy, reduce the accuracy and volume of his fire and, in its ultimate application, to cause the enemy to abandon all else save self-preservation. Movement enables infantry units to close upon the enemy, to occupy positions more favorable for the accurate delivery of fire, or to penetrate between or around areas held by an enemy. Fire power is constantly combined with movement in such a manner that the one facilitates the progress of the other. Finally, shock action is the culmination of fire and movement in which the destruction or capture of the enemy is effected by hand-to-hand combat.

The hazards of infantry in battle (as well as the principal task of the medical officer) are sufficiently attested by considering the AEF casualty rates. The battle casualties of the AEF were 260,783; of this total the infantry incurred 229,223 or approximately 88 per cent. The casualty rate per thousand of infantrymen was 583.96.



Plate 1. Private John Doe, Infantry.

Organization of Infantry Units. The *squad* is the elementary combat unit. It is the largest infantry unit habitually controlled by the voice and signals of its leader. A well-trained squad constitutes a team capable of resisting and disintegrating influences of battle and carrying out its assigned mission. The rifle squad consists of a leader, a second-in-command, and five to ten riflemen. Personnel armed with weapons heavier than the rifle are organized in squads for purposes of control. In general, these squads consist of a leader and a gun crew to operate one or more weapons.

The *rifle platoon* is the smallest unit with capacity for deployment in depth and width and endowed with independent power of maneuver. Three rifle squads and one automatic rifle squad are grouped together in the rifle platoon. It includes no weapons appreciably less mobile than those of the rifle squad nor any weapons presenting considerable relief in firing position. The platoon is the smallest unit which is commanded by an officer.

The *company* is the basic infantry unit with administrative and supply functions. It comprises a company headquarters and several platoons with the agencies necessary

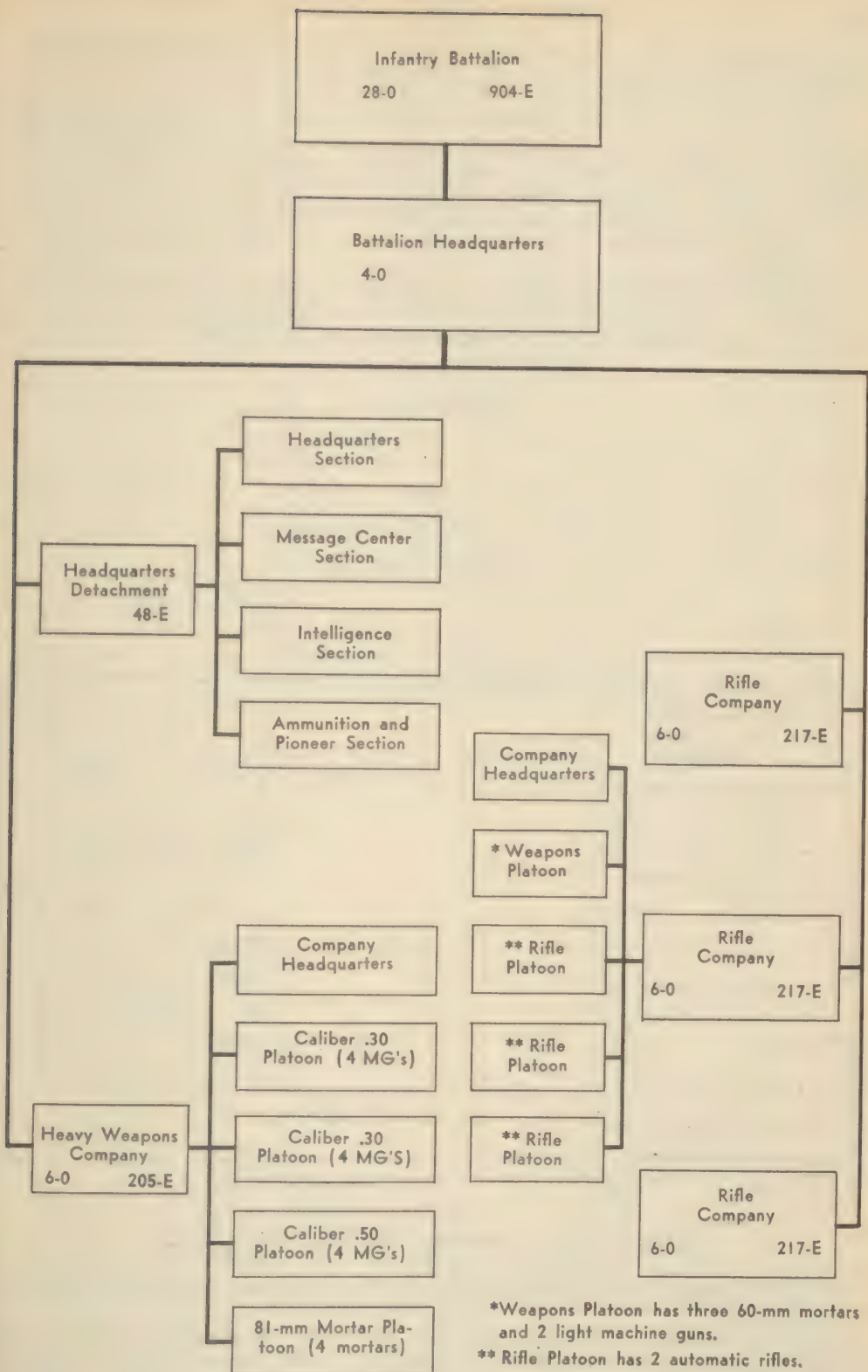


Plate 2. T/O 7-18. Infantry Battalion, October 1, 1940.

for their control, subsistence, and administration. Companies are classified as combat companies and headquarters and service companies. The company is the appropriate command of a captain.

Combat companies of rifle regiments include rifle companies, antitank companies, and heavy weapons companies. The rifle company combines the action of several rifle platoons with that of a weapons platoon. It is the smallest unit which habitually organizes a base of fire in the attack. It contains only elements which have a normal march mobility approximately that of the rifleman. *Heavy weapons companies* comprise machine gun, mortar, and antitank platoons. The *antitank company* comprises three platoons.

Headquarters companies are principally constituted by groups charged with collecting information and disseminating orders and instructions. They may include other elements not large enough to justify a separate supply and administrative overhead.

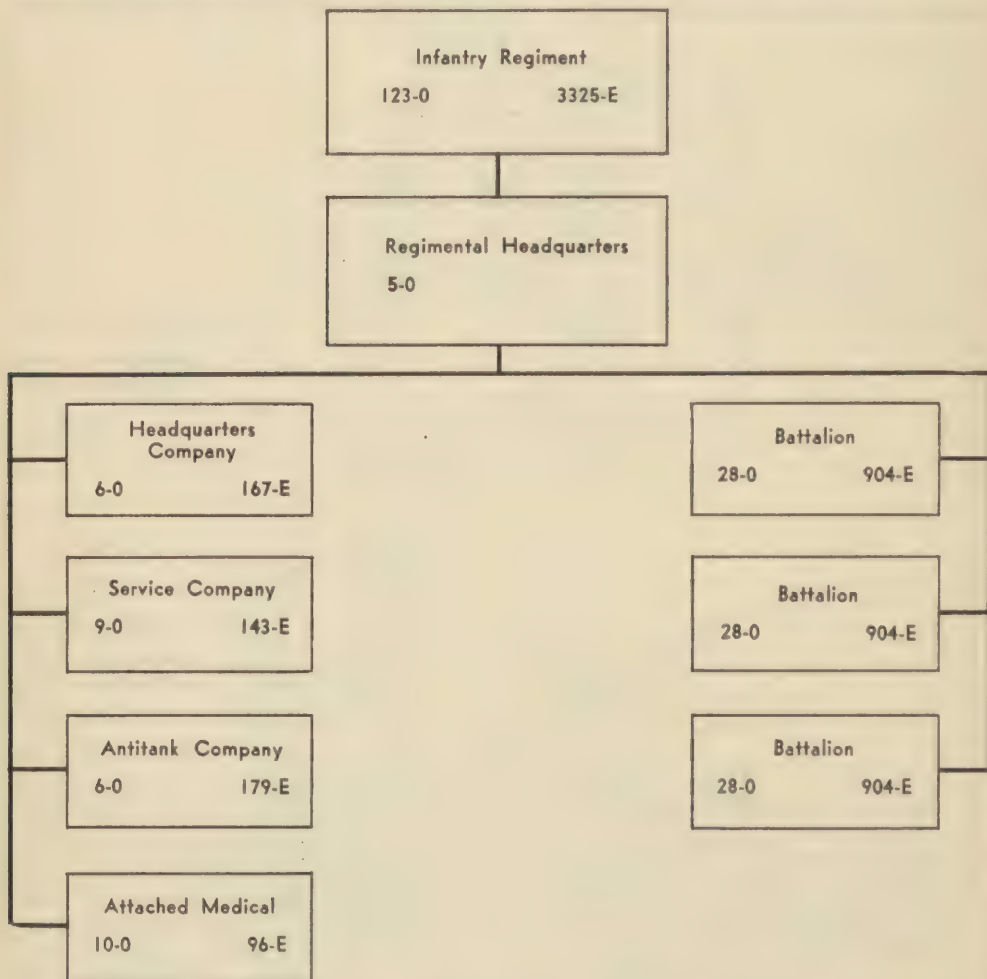


Plate 3. T/O 7-11. Infantry Regiment, October 1, 1940.

Service companies furnish staff, supply, and transportation personnel, and operate transportation.

The *rifle battalion* is the basic tactical unit of infantry. It consists of a headquarters and headquarters detachment, three rifle companies, and a heavy weapons company. The battalion constitutes a complete infantry unit capable of assignment to a mission

requiring the application of all the usual foot infantry means of action. Organically, it includes no weapon which cannot be manhandled over a distance of several hundred yards. Plate 2 shows the organization of the infantry battalion. It is commanded by a lieutenant colonel.

The *infantry regiment* is the complete tactical and administrative unit. The regimental commander, in addition to coordinating the action of his own units in battle, usually motivates the action of a varying allotment of weapons in supporting arms, particularly artillery. Plate 3 shows the organization of the infantry regiment. It is commanded by a colonel.

The *infantry brigade* is a component of the infantry division, "square." It consists of a headquarters and headquarters company and two infantry regiments. It is commanded by a brigadier general.

Commanders of infantry regiments and battalions require *staff assistants*. These staff groups are relatively small. The staff of the battalion commander consists of an executive and operations officer (S-3), an adjutant and intelligence officer (S-1 and S-2), and a detachment commander and transport officer. The battalion may be supplied from means available to the regimental commander with a supply officer, a communications officer with personnel to install and operate communications facilities, and a battalion section of the regimental medical detachment, including an officer to function as battalion surgeon. The staff of the regimental commander consists of an executive officer, an adjutant (S-1), intelligence officer (S-2), operations officer (S-3), a supply officer (S-4) who commands the regimental supply service, a regimental surgeon who commands the regimental medical detachment, other staff assistants for functional purposes, and three chaplains.

The term *combat team* is in common usage in field operations. It consists of an infantry regiment, a battalion of light field artillery, and such other units as may be prescribed by the division commander. The expression "CT 21" means the 21st infantry with the supporting and service elements which accompany it as standing operating procedure.

Designation of Units by Number or Letter. The battalions are numbered. Companies are lettered or named. The units of the infantry regiment are designated as shown below:

Regimental headquarters

Headquarters company

Service company

Antitank company

1st battalion:

Battalion headquarters and headquarters detachment

Company A (rifle)

Company B (rifle)

Company C (rifle)

Company D (heavy weapons)

2d battalion:

Battalion headquarters, headquarters detachment, companies E, F, G (rifle), and H (heavy weapons)

3d battalion:

Battalion headquarters, headquarters detachment, companies I, K, L (rifle), and M (heavy weapons)

Regimental medical detachment (attached)

Chaplains (attached)

Infantry Weapons. The weapons furnished the rifle company are designed to satisfy the special missions of this unit. It is the infantry unit which leads the way in attack and holds the most advanced positions in defense. The weapons are the rifle, the automatic rifle, light machine gun, 60-mm mortar, and the bayonet. (See Plates 4, 5, 6, and 7.) The automatic pistol is carried by some members of the company. Hand grenades are used on short-range missions. The rifleman fights on foot. Motor trans-

port is used to place him quickly at a location close to the battle area, to supply him, and to evacuate his casualties. All weapons of the rifle company are carried by hand, and, except for supply of ammunition, transport is not required in battle. The weapons are light in weight, capable of a high volume of accurate fire, and reach their greatest effectiveness at relatively short ranges.

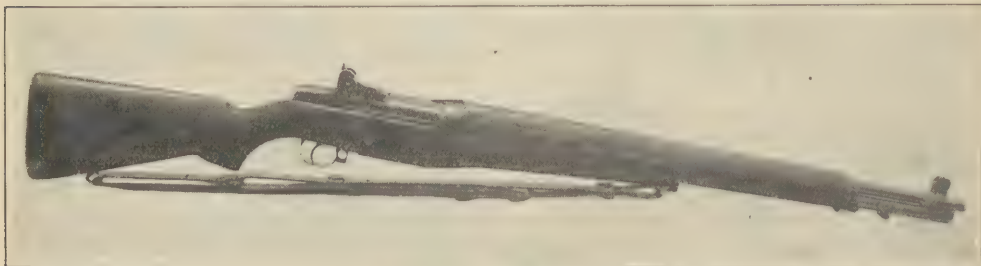


Plate 4. The Rifle.

The intrenching tool is an important article of equipment of the infantry soldier. With few exceptions he is equipped with some form of portable tool: shovel, pick-mattock, hand ax, or wire cutter.

The heavy weapons company provides supporting fires for rifle companies of the infantry battalion. This may involve adding to the intensity of their fires to assist in gaining fire superiority, or engaging targets which are beyond the range or capabilities of rifle-companies weapons. The weapons provided are the caliber .30 machine gun (8 MG's), the caliber .50 machine gun (4 MG's), and the 81-mm mortar (4 mortars). (See Plates 8, 9, and 10.) The machine guns provide a high volume of flat-trajectory

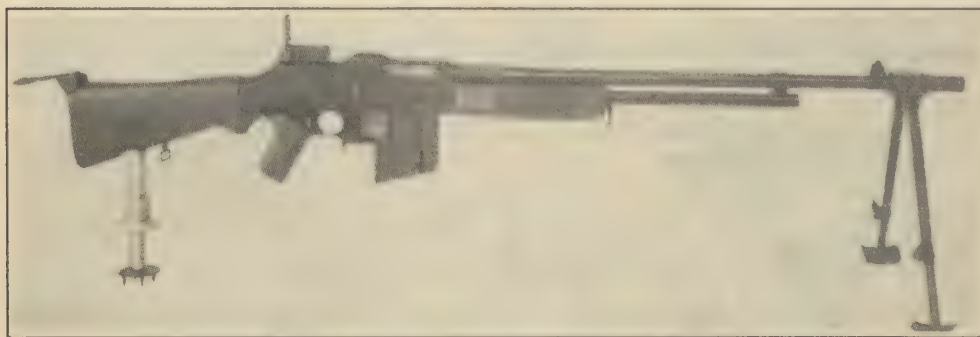


Plate 5. The Browning Automatic Rifle.

fire which can be employed effectively by day or night, in fog, rain or smoke, in any condition of weather or visibility. These characteristics are available because of the tripod which provides a fixed mount, enabling fire to be delivered in any predetermined elevation or direction. While the principal method of fire delivery is by direct laying, in which the target is visible to the gunner, the machine guns may also be used effectively for indirect laying, when the target is invisible to the gunner, by the use of instrument or map-firing methods. Machine guns support rifle units from positions abreast of their advanced elements or from positions in their rear or behind their flanks. Fires from rear positions are delivered through gaps between rifle units, by overhead fire, or to points outside their flanks. The caliber .50 machine gun is effective against hostile motorized and lightly armored vehicles; it is not an effective weapon to be used against heavily armored tanks. The caliber .30 machine gun may shift its fire almost instantly to engage hostile low-flying aircraft such as dive bombers.

The 81-mm mortar is a high-trajectory weapon using a heavy shell with a bursting



Plate 6. The Light Machine Gun.



Plate 7. The 60-mm Mortar.

radius substantially equal to the 75-mm light artillery projectile, and a lighter shell which reaches to much greater ranges with a reduction in bursting effect. (See Plate 12.) The weapon is used to engage enemy targets in areas in defilade from flat-trajectory weapons such as targets on reverse slopes, ravines, and trenches.



Plate 8. Machine Gun, Caliber .30.

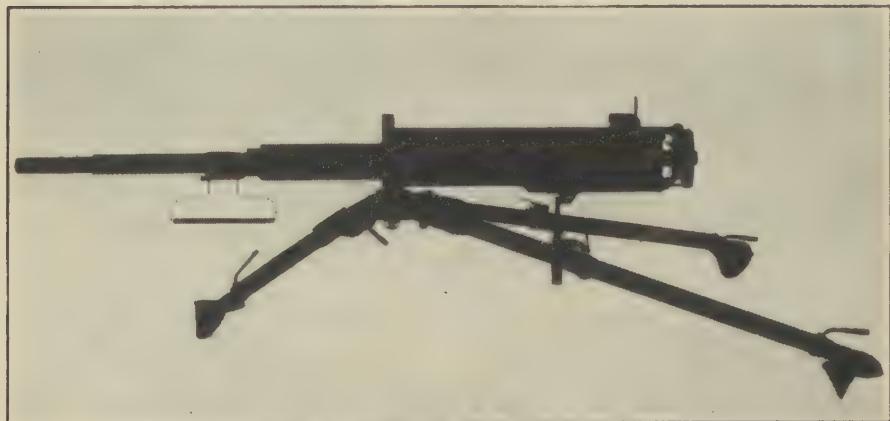


Plate 9. Machine Gun, Caliber .50.

Infantry heavy weapons may be moved by hand for short distances without undue fatigue or for long distances with sacrifice of speed and with fatigue losses. They are provided with transport for battle movement and displacement as the action proceeds. Trucks, mule-drawn carts (now obsolescent), and pack mules are employed. Transport is also required for ammunition supply.

The antitank company is furnished the 37-mm antitank gun. (See Plate 11.) It



Plate 10. 81-mm Mortar.

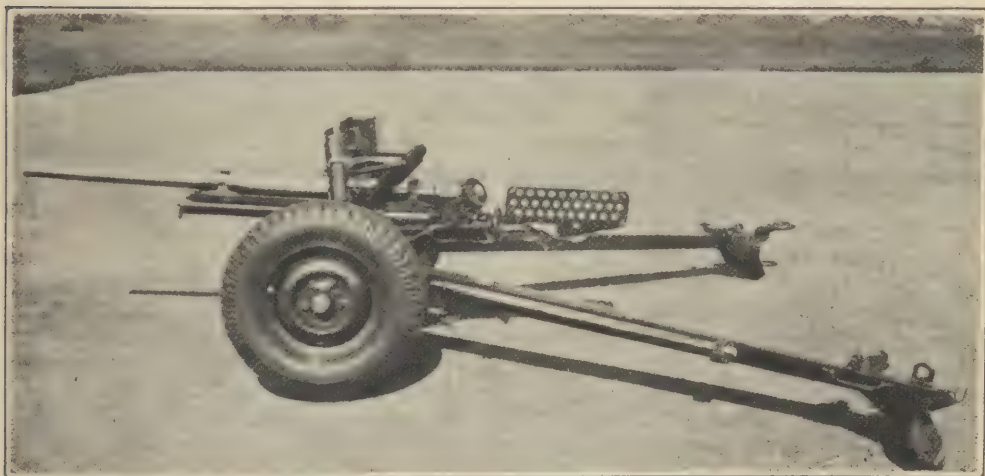


Plate 11. The 37-mm Antitank Gun.

is used to engage hostile mechanized vehicles, including tanks. The company is organized into three platoons, each of which operates four AT guns, a total of twelve guns. The antimechanized defense of a large force, such as the infantry division, includes the use of the caliber .50 machine guns of the heavy weapons company and the antitank battery of the division artillery, which is furnished with 75-mm guns, enabling it to destroy tanks of the heaviest type. Truck transport is required for moving this weapon except for short changes of position incident to changes of firing position.

Weapon	Caliber (inches)	Maximum range (yards)	Service effective range (yards)	Weight of piece (pounds)	Usable rate of fire (per minute)	Weight of ammunition
Rifle, M1 (Garand) ....	.30	5500	1000	9.4	15-30	1 ounce
Rifle, M1903 .....	.30	5500	1000	8.4	7-10	1 ounce
Automatic rifle .....	.30	5500	1000	17.1	40-60	1 ounce
Machine gun .....	.30	5500	3500	82.0	250	1 ounce
Machine gun .....	.50	7500	5000	128.0	250	4 ounces
37-mm AT gun	1.4	7500	1600	850.0	15-20	4 lbs.
60-mm mortar	2.4	1300	1000	51.4	30-35	2.4 lbs.
81-mm mortar	3.2	3280	2000	134.0	30-35	7.2 lbs.
			1500		30-35	15.8 lbs.
Pistol .....	.45	1600	50	2.4		1.5 ounces
Hand grenade		50	50			1.3 lbs.

Plate 12. Characteristics of Infantry Weapons.

Communications, Supply, and Evacuation. Communication facilities of the regiment of infantry include telephone, telegraph, radio, and messenger service. The headquarters company contains the communication platoon with four sections which install and operate the facilities. Each battalion has personnel to operate its own message center. Sections are provided for regimental headquarters and, when required, for each of the three battalions.

The service company contains a transportation platoon with a section for each battalion, the headquarters company, and the antitank company. This arrangement pools all transportation available to the regiment, except tactical vehicles which remain with the organizations to which they are issued.

The regimental medical detachment (attached medical personnel) initiates evacuation of the sick and wounded. For functional purposes it may be divided into a regimental section and three battalion sections. Each section is staffed and equipped to set up and operate an aid station at which casualties are assembled and prepared for evacuation.

Basic Factors of Infantry Combat. As infantry is the arm of close combat, it operates in the zone of intense hostile fire. This obliges infantry to adopt extended formations and to take the fullest advantage of the terrain in order to reduce the degree of vulnerability. Even small tactical units are distributed over a considerable area, and battlefield control is difficult. Infantry subordinate leaders see only a small portion of the battlefield and often fight in ignorance of the general situation and the major results obtained. They direct the local combats which make up the battle, the sum of which constitutes success or failure.

Fire and Movement. Foot infantry has two principal means of action: fire and movement. There must be the closest possible coordination between them in order that infantry may close with the enemy and break his resistance. Fire destroys or neutralizes the enemy and must be used to protect all movement in the presence of the enemy not masked by cover, darkness, fog, or smoke. Through movement, infantry places itself in positions which increase its destructive powers by decrease of the range, by the development of convergent fires, and by flanking action.

Movement. Infantry is adapted to movement on all kinds of terrain. Its ability to move in small and inconspicuous formations minimizes the effects of hostile fire and permits the use of covered routes of approach for its advance, and minor accidents

of terrain as firing and cover positions. Motorized weapon and ammunition carriers are used to maintain battlefield mobility of heavy weapons.

Fire. The fires of the various infantry weapons require coordination. The flat-trajectory weapons pin the enemy to the ground and cause him to seek shelter; the fire of curved-trajectory weapons reaches an enemy protected from flat-trajectory fire. Frontal fires directed upon an enemy combined with flanking fires produce destructive convergent fires.

Field of fire. The field of fire is the area throughout which fire can be delivered from a single firing position. Good fields of fire are to be found in level or uniformly sloping terrain unbroken by vegetation which might conceal an enemy from view and free from terrain formations which provide the enemy with defilade from fire.

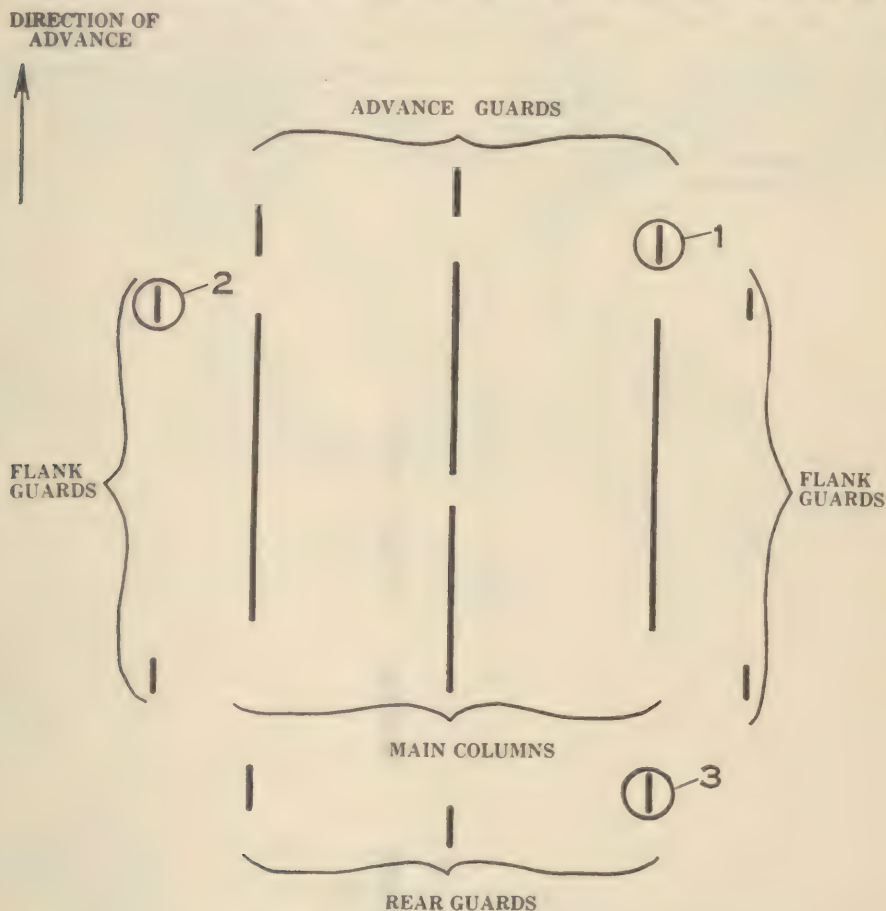


Plate 13. Area of Marching Columns.

Base of fire. In the presence of the enemy, infantry seeks to protect its movements by fire action including a *base of fire*. The organization of a base of fire comprises establishment of the attacking echelon on a departure position; emplacement of the supporting weapons of the unit in firing position to support the advance of the attacking echelon; synchronization of the debouchment of the attacking riflemen with the fire of the supporting weapons from the base of fire. The rifle company is the smallest unit which habitually employs a base of fire in the attack.

Terrain. Terrain exercises an important and often a decisive influence in tactical operations. It usually dictates the dispositions of infantry units and their plan of

maneuver or defense plan. Small infantry units have only a limited latitude in the choice of the terrain of operations. They must make the best possible use of the terrain of the zone of action or sector to which they are assigned.

Gently sloping, open terrain permits full use of the flanking action of flat-trajectory infantry weapons and hence increases the power of the defense against infantry attack. Conversely such terrain offers little cover to attacking foot troops but favors tank attack. Strong tank or artillery support is required to permit infantry to attack successfully over such terrain without severe losses.

Broken terrain limits the defender's field of observation and flat-trajectory fire and offers cover by which attacking foot infantry may approach a hostile position. Defensive positions located on terrain of this character require increased density of occupation of forward defensive areas and an increased allotment of curved-trajectory weapons.

Rolling terrain affording some cover and facilities for observation is the most favorable for attacking foot infantry. Crests, ridges, woods, or other features which extend generally parallel to the direction of advance divide the terrain into corridors which are natural avenues of penetration. The visible horizon will therefore usually delimit an infantry maneuver phase and often constitutes an initial objective. Long, narrow terrain compartments which lead in the general direction of a defensive area form advantageous corridors for attack.

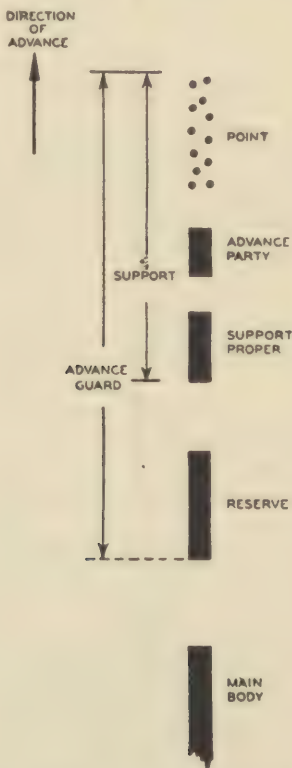


Plate 14. Advance Guard, Contact Remote.

Infantry in Security. The cardinal military sin is to allow one's self to be surprised. Security measures must be taken if surprise is to be avoided. The measures must be continuous, in camp or bivouac, on the march, and during battle. *Advance guards*, *flank guards*, *rear guards*, and *outposts*, as the situation may require, are provided for the purpose. (See Plate 13.) It would be rare to use more than one-third of the strength of a command in security missions.

The *advance guard* is a force sent out to the front to precede and cover the main body

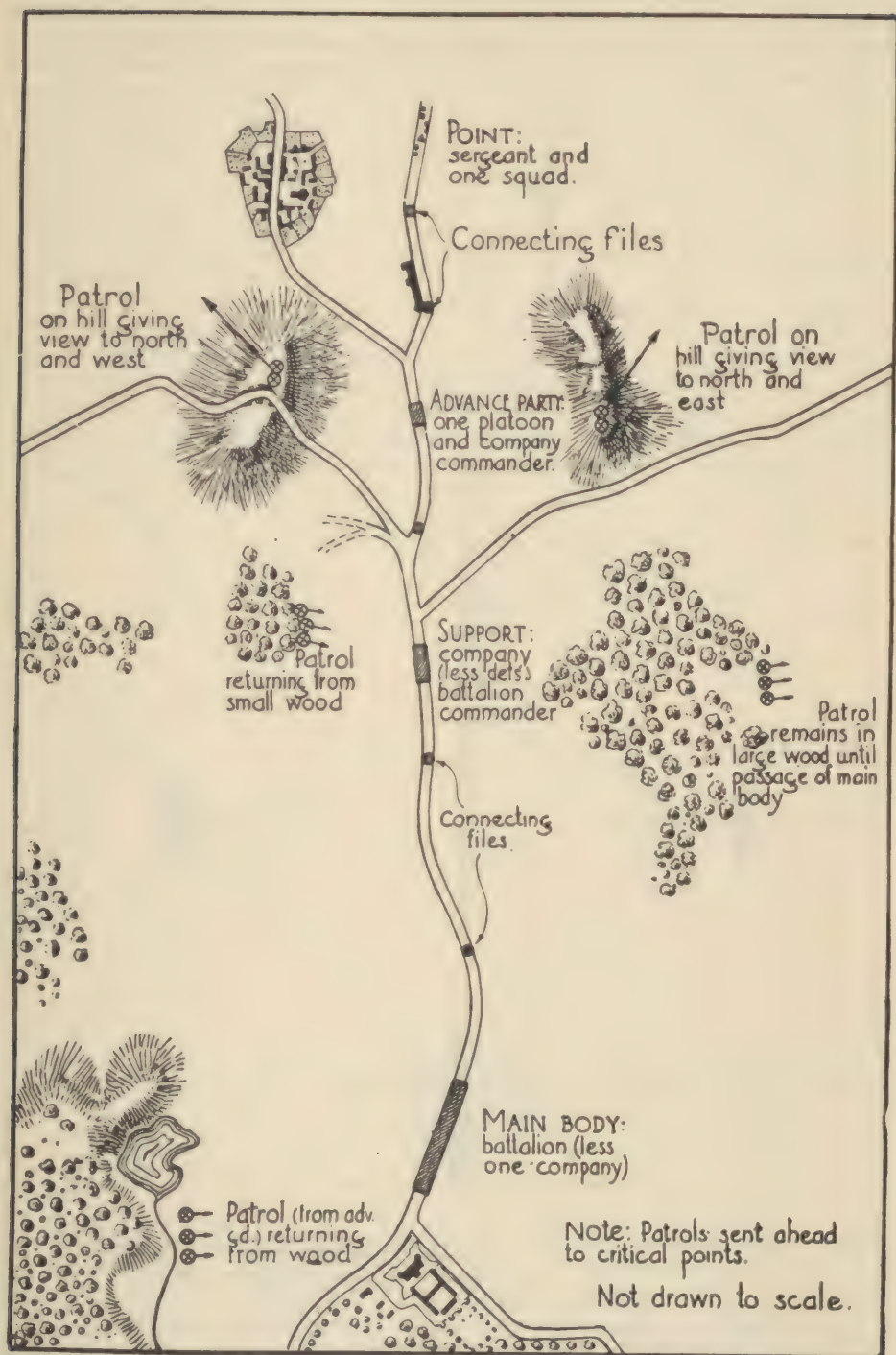


Plate 15. A Company of Infantry as an Advance Guard to a Battalion, Contact Remote.

on the march. It prevents the enemy from observing and firing on the main body, maintains the proper direction of march, and removes obstacles from the route to facilitate the march. When resistance is encountered the advance guard takes prompt and aggressive action to dislodge the enemy and provide for the uninterrupted advance of the main body. If the resistance is too strong or too extensive to be thus overpowered, the advance guard

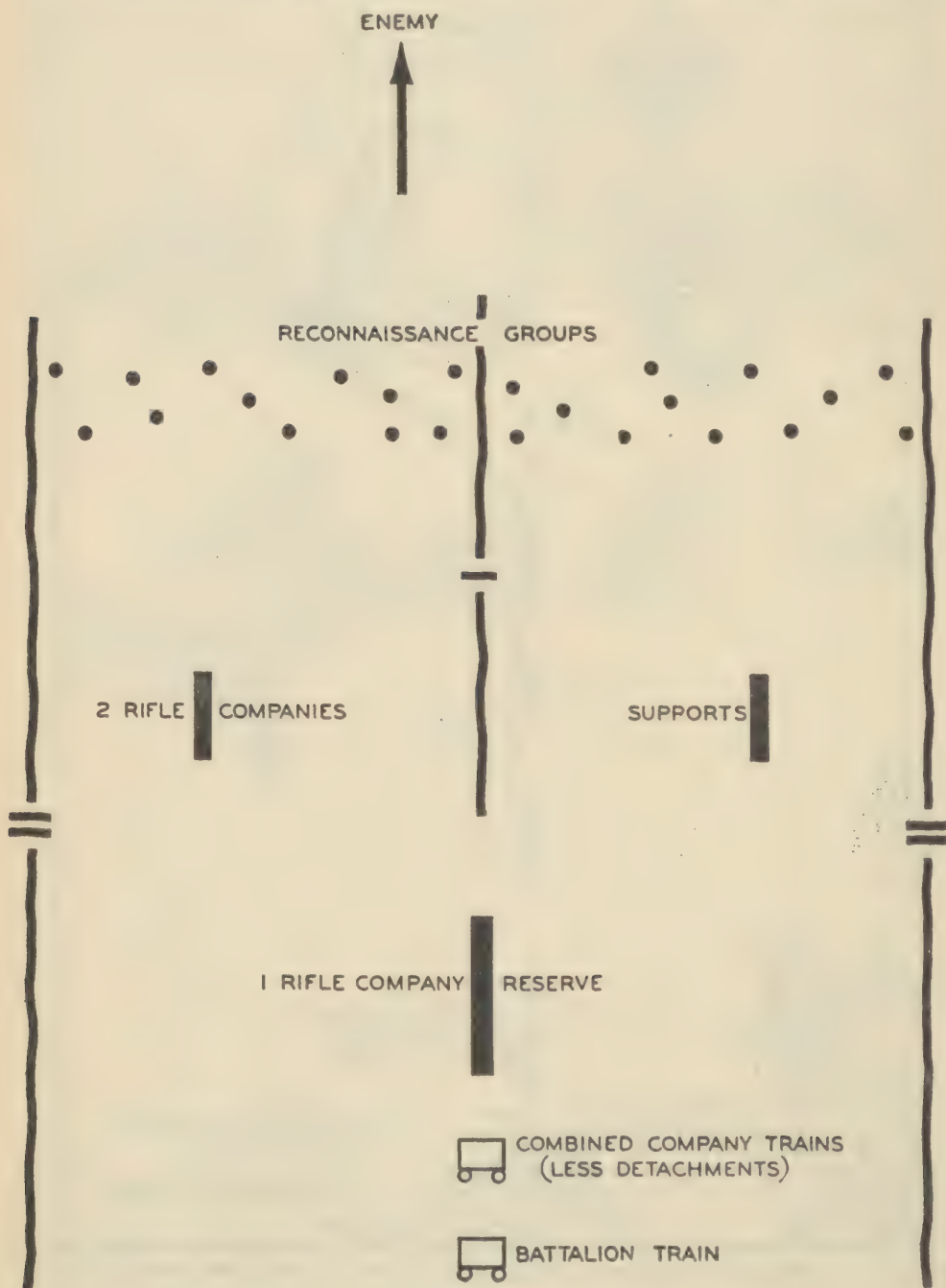


Plate 16. Battalion in Advance Guard, Contact Imminent.

fixes the enemy in position, locates the flanks of the enemy, and facilitates action which may later be required by all or a portion of the main body. The advance guard consists of the *point*, *advance party*, *support*, and *reserve*. A small advance guard may omit the reserve. Connecting files consisting of one or two men provide communication and contact between elements of the advance guard. (See Plates 14 and 15.) *Flank guards* and *rear guards* protect the flanks and rear of the main body in a similar manner. Elements of the advance guard are separated so that, for example, in an advance guard as large as a battalion with artillery, the point might be as much as $3\frac{1}{2}$ miles in advance of the head of the main body. In rugged or wooded terrain, and at night, distances are reduced.

When possibility of contact with an enemy is remote, the advance guard will march on roads, in suitable formation, and utilize patrols to investigate areas of potential danger which might conceal an enemy.

When possibility of contact with an enemy is imminent, advance guards deploy so that they cover the entire zone of advance of the marching column or columns. (See Plate 16.) Many of the elements must now march across country, and accordingly the rate of march is materially decreased. A zone of advance is prescribed, limited by lateral boundaries. Forward progress is limited by phase lines prescribed by the superior commander. Should contact with an enemy be made, the advance guard is partially deployed, the entire area can be searched for hostile groups, and offensive action may be taken promptly.

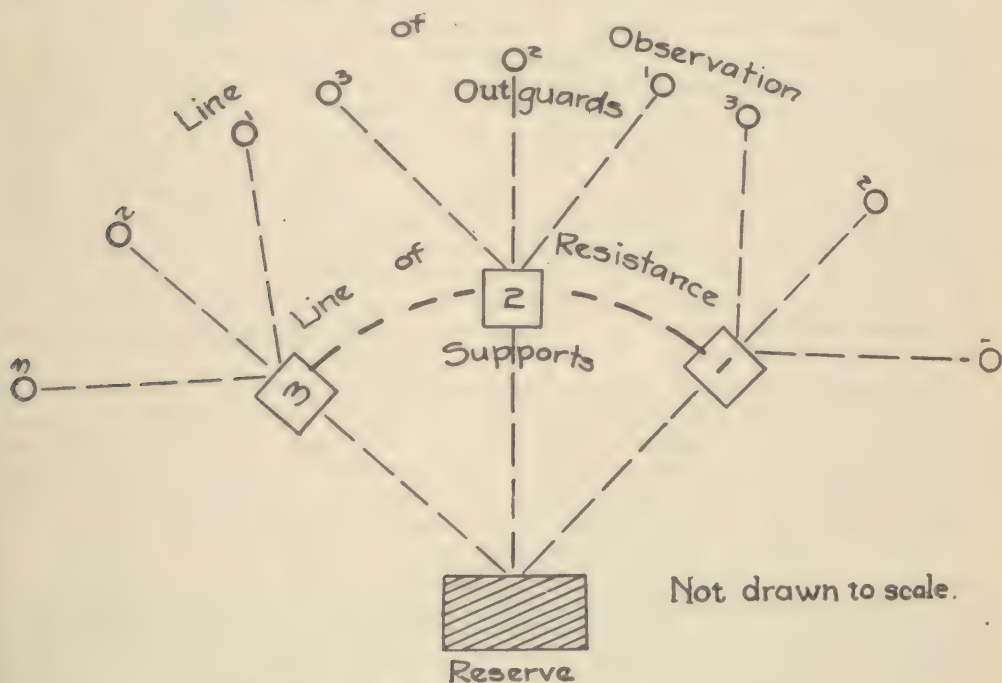


Plate 17. Diagram of Outpost Dispositions.

In general, *flank guards* and *rear guards* adhere to the same principles of organization and operation as advance guards. They are to prevent an enemy from gaining contact with the main body or from interrupting the movement of the main body.

The *outpost* protects the main body while in camp or bivouac. A column halted for a period longer than the hourly rest is protected by a *march outpost* constituted at once by the advance guard.

Troops in camp or bivouac are protected by part of their number forming the outpost so that they may rest without the hazard of sudden and unexpected attack. Areas of

definite responsibility are assigned to units of the outpost designated as *supports*. (See Plate 17.) Each support sends out small detachments to important terrain localities where they remain in observation. Active patrolling is maintained between supports and their units in observation, for further protection. A *reserve* is held under the control of the outpost commander for disposition in case any part of the outpost line is threatened. An outpost defends or withdraws into the main position in accordance with orders of the commander of the main body.

Infantry in Attack. In an attack, an infantry unit may be placed in "assault," which means that it leads the advance, or it may be held in "reserve." The commander of an infantry regiment, for example, may place two of his three battalions in assault and hold one in reserve; or place one in assault and hold two in reserve; or, in rare instances, the entire regiment less one rifle company in assault, the one company constituting the regimental reserve. In a similar manner an infantry battalion commander would prescribe assault or reserve missions to his three rifle companies, and the rifle company commander would dispose his three rifle platoons. The heavy weapons company and the weapons platoon would support (i.e., assist with fire action) the assault units of the battalion and company, respectively. The heavy weapons company of an assault battalion is not usually held in reserve.

This organization for combat of an infantry unit depends upon the mission, the terrain, and the capabilities of the enemy. In an obscure situation where little is known of the enemy the commander will wish to commit minimum strength to the assault in order to retain a strong reserve. When the advance is made within a wide zone, especially in broken, wooded, or rugged country, he will likewise prefer to retain a strong reserve. A regiment making the main attack will need a strong reserve element in order to have forces available to extend an envelopment, or pass through an assault battalion in order to continue the action with fresh troops, or to counter quickly actions which may be launched by the enemy. On the other hand, a regiment which is making the holding attack is not expected to penetrate deeply into the enemy position; it will need to develop its maximum power quickly to prevent the enemy from moving to meet the main attack, and to give the impression that the main attack is launched on his front. In such a case the commander will hold a weaker reserve. The organization for combat depends upon the mission assigned the infantry unit, the capabilities of the enemy, the width of the zone through which it is to advance, and the nature of the terrain.

Rifle companies of assault battalions "carry the fight to the enemy," but they do not fight alone. An overwhelming fire or tank support is usually required to permit an attacker to advance against strong resistance. The heavy weapons company provides strong fire support with its machine guns and mortars, placing the fires where they will be of the greatest help to the assault units. In a similar manner and for the same reasons the weapons platoon of rifle companies assists the rifle platoons with fire support, using the light machine guns and 60-mm mortars. The rifle platoon has automatic rifles which it may employ to assist the squads. It is an application of the principle that infantry operates by combining "fire and movement," which means that a portion of a unit forms a base of fire and fires upon an enemy position in order to gain or maintain fire superiority while the remainder moves or maneuvers through concealed or defiladed routes to approach closer to the immediate objective. All of the weapons available to the battalion commander or rifle company commander are employed in a coordinated action to reach the objective, as the first goal, and then, as the second, to reach it with minimum casualties and in the quickest time.

An infantry battalion in assault operates, in the usual case, within a zone of action. (See Plate 18.) This zone includes the line of departure from which the attack will start; the objective, or destination, or goal of the advance; and, for interior battalions, a right boundary and left boundary. A battalion on the right flank of a larger force may have only a left boundary with no restrictions as to the area of movement on its right. Boundaries are prescribed only where necessary to assist coordination of adjacent units. For small units, such as the infantry battalion, boun-

daries should be outlined by clearly visible objects to prevent the likelihood of loss of direction and straying into the zone of action of an adjacent organization. The orders for the attack prescribe the line of departure, the objective, and the boundaries if any are necessary. The order also prescribes the time of attack at which assault units leave the line of departure or cross the line of departure. Prior to the time set for the attack, battalions often occupy an "assembly position" in rear of the line of departure where many arrangements are made which may include partial issue of orders, feeding the troops, issue of extra ammunition, and dropping of packs. Somewhat in advance of

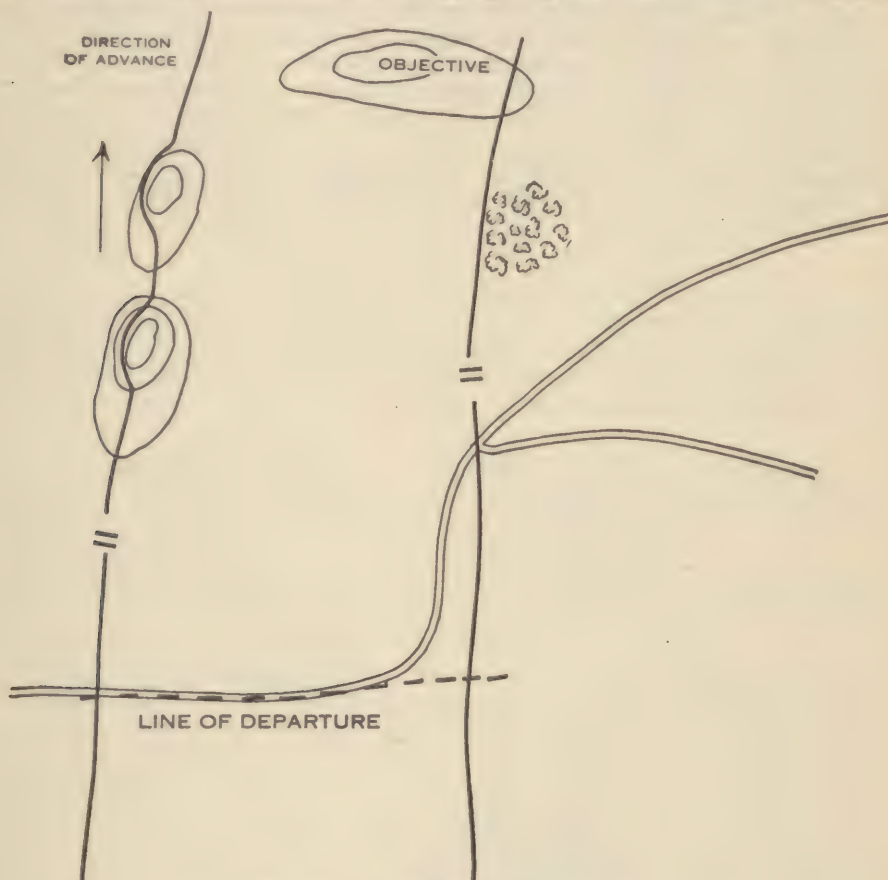


Plate 18. A Battalion Zone.

the time of attack, units are moved forward to the line of departure. Here appropriate formations are taken to start the advance, final orders are issued, supporting weapons are emplaced, and coordination completed, all in time to start the advance at the time prescribed. It is essential that small units understand, before the start, their destination or the objective they are to reach, the route they are to follow (limits of the zone of action), and the initial formation they are to use. After the start, events will control their action.

The *main effort* of a unit aims at securing ground, the possession of which will facilitate the capture of the objective or the advance of other elements. It is usually made against a weak area in the hostile dispositions.

Infantry rifle units pass through the following phases in an attack which is launched from a line of departure outside the area of contact: the *approach march*, the *fire fight* or *conduct of the attack*, the *assault*, and the subsequent operations among which will be reorganization, defense or preparations to defend the position captured, resumption of the attack, or pursuit.

The *approach march* is the advance forward, in suitable formations, from an assembly area through the zone of hostile artillery fire to and across the line of departure. Leading infantry units are preceded by scouts who search for enemy positions, forcing him to disclose himself. Formations are used of minimum vulnerability and maximum ease of control which also facilitate the skillful use of cover. For example, a platoon might advance in line of squad columns, the members of each squad following generally behind the squad leader who is responsible, within limits, for selecting the best and safest route. Within squads the men are separated in depth, and the squads are separated by intervals as great as fifty yards. Dangerous areas are avoided. Fire-swept areas which cannot be avoided are crossed as quickly as possible with minimum exposure. Rifle units do not fire during the approach march but seek to advance rapidly with minimum exposure. The fires delivered, if any, are from infantry heavy weapons and artillery. The approach march ends when the effectiveness of hostile fire makes it necessary for rifle units to return the fire with their own weapons and obtain fire superiority in order to continue the advance without suffering ruinous losses. Rifle fire is not ordinarily opened at ranges beyond 400 yards.

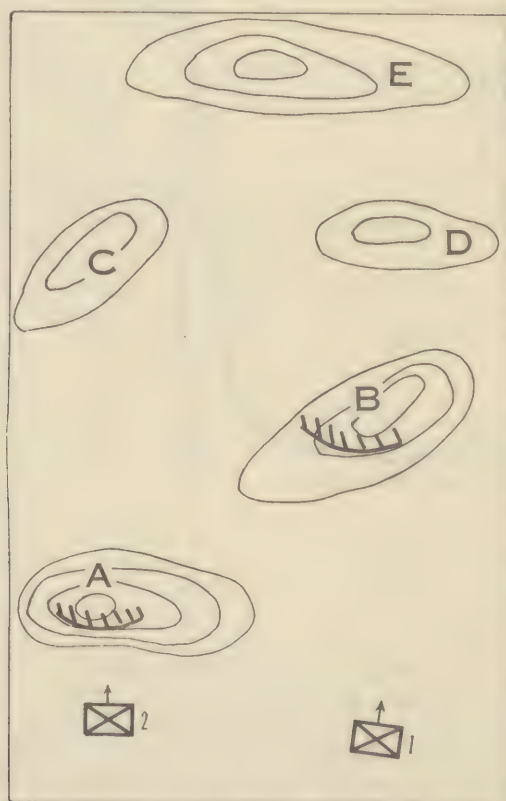


Plate 19. Successive Objectives.

In the *conduct of the attack* rifle units seek to combine their fires with those of the supporting weapons. The combined fire action creates the conditions which make possible the movement of the attacking echelon. The rifle units exploit these conditions by alternate fire and movement. While some of the riflemen open fire to hold down the fire of the enemy resistances, others advance from one cover or firing position to another. Every lull in hostile fire is utilized to push groups to the front and occupy points from which covering fire, particularly the flanking fire of light machine guns, will facilitate the further progress of attacking units. The infantry supporting weapons,

displacing forward when necessary, cover the advance of the rifle units to close range, protect their flanks, and assist in the reduction of hostile resistance. Infantry action continues in this manner until hostile resistance is broken, advancing by bounds on successive terrain features or objectives where the fire support for the next advance is arranged. (See Plate 19.) In such action the importance of the small units and the leaders of small units should be apparent. Along the extended front of a large force in an offensive operation there are a large number of these actions, each striving to overcome the hostile resistance, and each seeking to advance upon its objective.

During the progress of the attack, commanders will employ the units held in reserve. For example, assume that an assault rifle company has been stopped by hostile resistance which it cannot avoid or overcome. The battalion commander, after calling for such supporting artillery fires as are available and providing for the support of the heavy weapons of the battalion, might direct a reserve company to maneuver to strike the resistance from a different direction, or avoid it and pass on toward the objective, or add its fires to the troops engaging the enemy and then pass through them to become the assault company, whichever seems most likely to achieve the success. He will not employ his reserve piecemeal, or fritter it away in dribbles, but use it to make a strong, coordinated blow.

In this manner the advance is continued by infantry units. By fire action they seek to neutralize the effect of the hostile resistance. By movement they seek to occupy his position. It must be seen that the action is controlled and coordinated by commanders of successive echelons and that assault units are given all possible support by infantry heavy weapons, by artillery, and by tanks to precede assault rifle units when tanks are available.

The *assault* is the final advance into an enemy position. It may terminate in hand-to-hand fighting. There is no set distance from the enemy position at which the assault is begun. Supporting fires are shifted to other targets which do not endanger the attacking friendly troops. The assault is a very critical period.

Following a successful assault, troops occupy the captured ground, prepare to resist counterattack, reorganize, replenish ammunition, and prepare for the next action which may be a continuation of the attack, pursuit, or defense.

Attack frontages for the infantry battalion depend upon the nature of the terrain, the mission, the nature of enemy organization, and the actual combat strength of the subordinate units. As a basis of comparison, a battalion making a strong attack against an organized position may advance within a zone 600-1000 yards in width. Against a hastily organized position in which somewhat less resistance is to be expected the zone may be increased to a width of 700-1000 yards. A battalion making a holding attack or secondary attack may advance within a zone of 900-1200 yards.

Attack zones of action are sought which provide terrain corridors, such as stream valleys, leading towards the objective. Such avenues of advance provide natural cover and defilade. When the advancing unit is able to control the ridge lines bounding the corridor they can reduce or eliminate the hazard of flanking fire.

Direct support artillery (light artillery) operates in close coordination with attacking infantry as a combat team. Fire is delivered upon enemy areas which are holding back an infantry advance, or which threaten to do so. An artillery liaison officer and detachment with communication facilities accompanies each assault battalion. This agency communicates requests for artillery fire, designates the exact location of suitable targets, and may observe the fire to communicate at once corrections in firing data to move the fire into the area desired. For example, a company commander of an assault unit may encounter a strong enemy position over which he is unable to secure fire superiority. He should call upon his battalion commander for fire support. The battalion commander will cause fires to be delivered from the battalion heavy weapons company and, if desirable, will request the artillery liaison officer to place fire upon the target. In an extreme case this request may result in fire into the area from artillery supporting adjacent units and in fire from medium artillery in general support of the entire force.

Infantry in Defense. In the defense, infantry units may be assigned to defend a sector, or defense area, on the main line of resistance or be placed in reserve. If in reserve they may occupy a defense area on the regimental reserve line or be held farther back in general reserve for the use of the commander, such as the division commander, when the direction and intensity of the hostile attack are disclosed. The infantry battalion is the "unit of measure" for planning or studying a defensive system. The sector assigned a battalion will usually include an important terrain feature; the size of this sector will depend upon the mission and the terrain. The important factor is that battalions are assigned key points of terrain, in width as well as depth, and these localities, called "defense areas," are then organized to resist attack from any direction. (See Plates 20 and 21.)

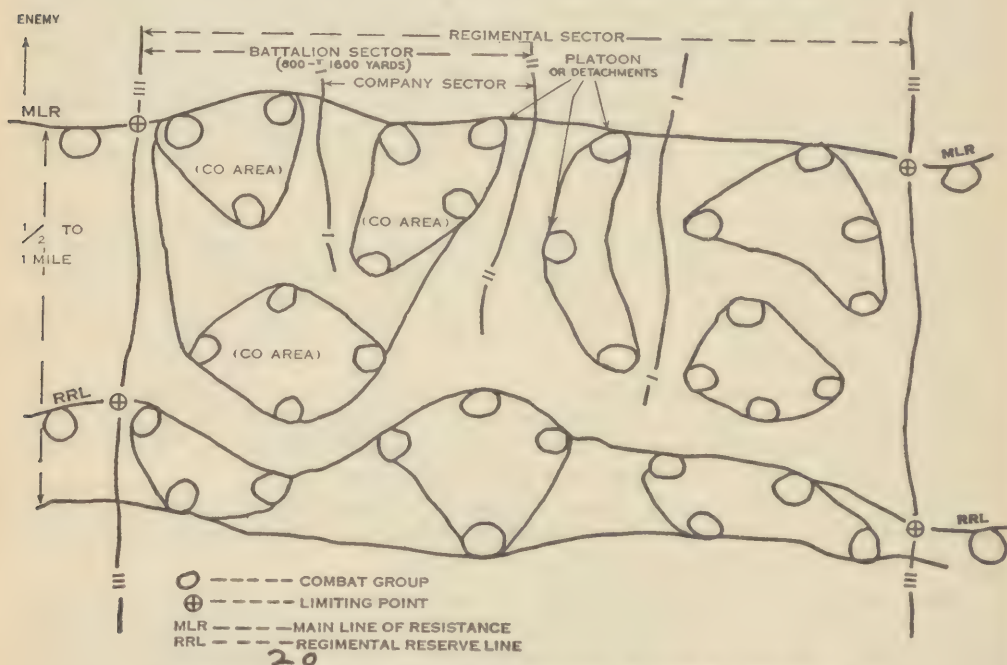


Plate 20. Diagram of a Regimental Sector in Defense.

Battalion sectors having been designated, the battalion commander provides for the defense by assigning company areas; in turn company commanders dispose their platoons. (See Plate 20.)

The *frontage* which an infantry battalion on the main line of resistance can defend depends upon the mission, the terrain, and the natural obstacles to hostile advance. As a basis of comparison, where the observation is poor and the area is vital a battalion can defend on a front of 800 yards. On average terrain under the same conditions this frontage can be doubled. Where natural obstacles protect a position the frontage can be extended to as great a width as 3500 yards. Under a mission to effect delay on successive positions without becoming decisively engaged, this frontage may be further increased to a width as great as 5000 yards. A natural avenue of hostile approach, such as a terrain corridor leading into the position, should be assigned entirely to one battalion in order to avoid division of responsibility.

The *depth* of a battalion sector depends upon terrain, but it should have a minimum depth of 400-500 yards; it may be as deep as 1200 yards.

The *regimental reserve line* (RRL) is placed ahead of the dominant observation of the locality, and is usually from 800-2000 yards in rear of the main line of resistance.

The *battle position* includes the area between the forward limit of the main line of resistance and the rearmost parts of the regimental reserve line.

Mobile infantry reserves held by the commander to extend the flanks of the battle position or to launch counterattacks, and the supporting artillery, command, communication, supply, and evacuation establishments are placed in appropriate locations behind the battle position. It must not be inferred that a battalion occupying a sector on the main line of resistance

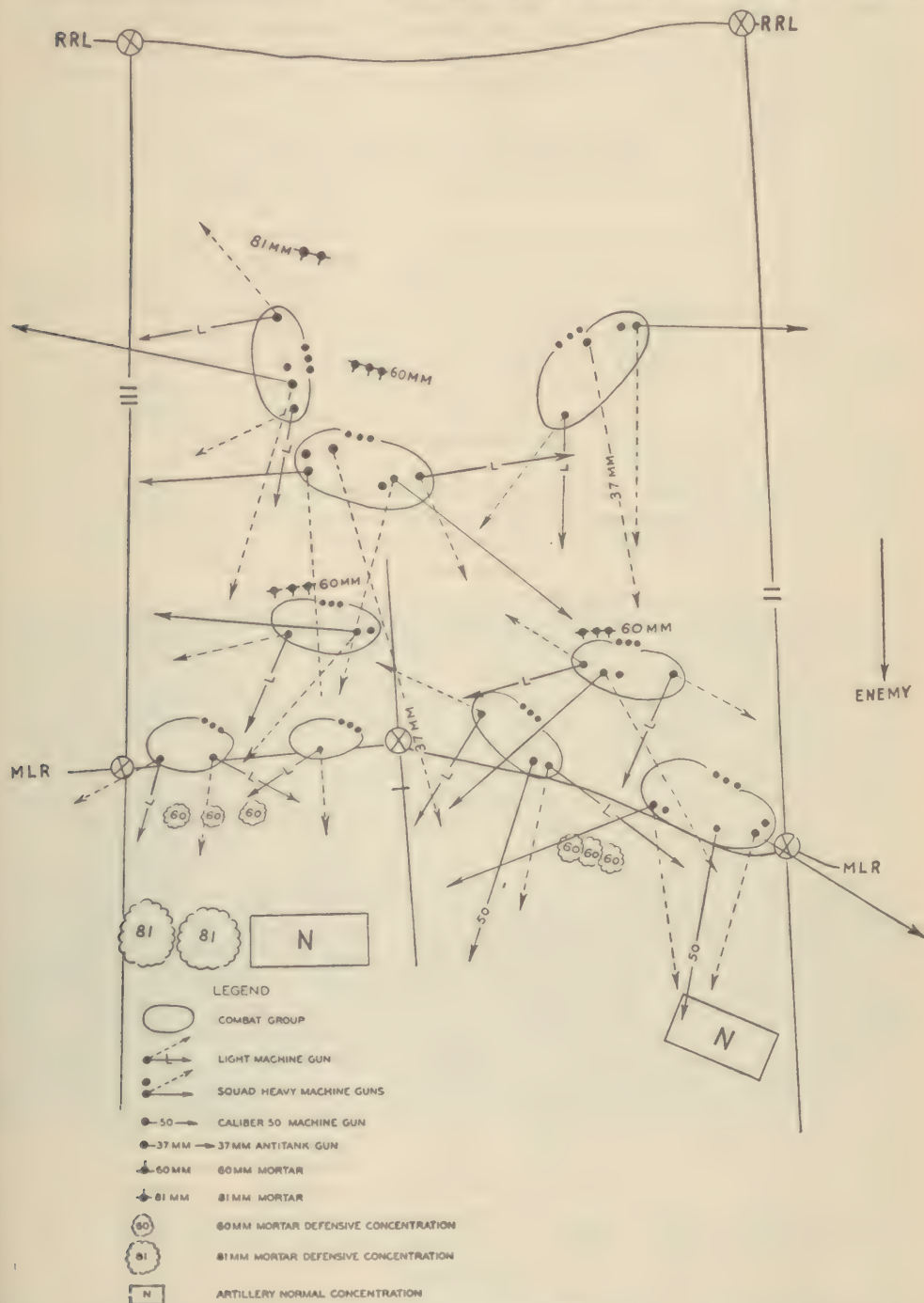


Plate 21. Defensive Fires.

The automatic rifles are located to cover gaps in the fires of the machine guns.

places its units to obtain uniform density. The contrary is the fact. Each rifle company will be assigned an area for defense having width and depth. Key points of terrain are actually occupied. Gaps between occupied areas are defended by fire.

The next step is the organization of the ground and the coordination of defensive fires. Trenches and gun positions are dug to increase safety and defensive strength. Camouflage is executed. Arrangements must be completed to cover the front and flanks of the position with defensive fires by assigning definite targets or definite areas of responsibility to each unit and each supporting weapon. Coordination with supporting artillery and adjacent units is obtained.

An *outpost line of resistance* is established on the next high ground in advance of the main line of resistance so that warning of an enemy approach may be obtained. This consists of small groups. Road blocks may be established as a precaution against attack by mechanized forces.

Demolitions may be executed to further hamper a hostile advance.

Plans for the conduct of the defense, anticipating all hostile capabilities, are developed.

When the enemy approaches the position in attack, machine guns covering the main line of resistance and rifle company weapons open fire when the enemy arrives within ranges which compel him to lift the fire of his artillery to rearward areas. If the enemy succeeds in effecting a close approach to the main line of resistance, all close-in prearranged fires are released. If the enemy succeeds in entering the position, the defender seeks to strengthen and hold the flanks of the gap and counterattack the penetrating elements from the flank rather than attempt to close the gap by throwing troops across the head of the salient.

Antimechanized Defense. Infantry units must be prepared to resist attack or sudden raids by hostile mechanized units. Selection of positions for defense or bivouac will require a consideration of this danger and, wherever it is practicable to do so, advantage will be taken of natural obstacles such as streams, swamps, and other unsuitable terrain features along the front and flanks of the position.

Road blocks defended by antitank guns may be used extensively at bottlenecks such as bridges, mountain passes, and roads through swamps. The use of tank mines further increases the effectiveness of such obstacles.

Demolitions executed along the front and flanks of a position may be used to destroy bridges, culverts, or roads and to increase the difficulty of movement, especially when the works will not be needed for future use of the force.

The infantry weapons which are provided for antimechanized defense are the caliber .50 antitank gun (machine gun) and the 37-mm antitank gun. These guns are sited in depth throughout the battle position. Upon the approach of hostile mechanized units they are engaged at the maximum range and at a high rate of fire.

Combat Teams and Teamwork. The functioning of all infantry units involves the constant application of principles of cooperation and teamwork. Within the rifle company the rifle platoons function with the supporting fires of the 60-mm mortar and the light machine gun under the control of the company commander. Within the battalion the heavy weapons company constitutes a combat team with the rifle companies, all controlled by the battalion commander. Above all this is the infantry-artillery combat team in which direct-support artillery is in constant contact with the infantry units supported; it must be ready to place its strong supporting fires quickly upon areas as requested by infantry battalion commanders.

Thus it should be clear that infantry does not fight alone. The mission of the infantry, however, becomes the mission of the entire force. It is the infantry soldier, particularly the soldier of the rifle company, who goes forward to occupy in person areas held by the enemy. But he is helped in his task by the supporting weapons within the infantry, at times by tanks, by the artillery, and by all other arms and the services. Teamwork between units on the battlefield is an absolute requirement for victory.

CAVALRY

Characteristics. The cavalry arm is equipped, organized, and trained to perform essential missions which occur in combat. Its dominant characteristic, mobility, is gained

to a high degree by the use of horses (horse cavalry) or by the use of armored vehicles **in which it moves and fights**. Because of this mobility it can shift its very material fire power from one tactical locality to another or from one position to another within the same tactical locality. Each type of transport and equipment has its advantages or favorable characteristics, and each has its disadvantages or unfavorable characteristics. Each type of cavalry can operate unaided by the other, if terrain or weather conditions make such use desirable, or they can operate in conjunction with one another.

Horse cavalry can operate under very difficult terrain conditions. It may not be wholly true that a well-mounted, well-trained cavalry unit can negotiate while mounted any terrain which can be traversed by dismounted men, but it approaches that condition more closely than motorized or mechanized units. Horse cavalry reaches its greatest role in difficult terrain where it alone may operate effectively or under conditions where the necessity for speed transcends all other requirements.

On roads cavalry can sustain a rate of six miles per hour by day and five miles per hour at night; for movements across country these rates are reduced to five and four miles per hour, respectively. For short periods these rates can be greatly increased. Horse cavalry in the United States Army has marched over 100 miles in a period of 24 hours. Under forced march conditions, infantry units require approximately 100 hours to march the same distance. The mobility of cavalry varies from about twice that of infantry for long marches to six times that of infantry for distances of a few miles.

Cavalry is sensitive to the conditions of its mounts. The losses in horseflesh incident to battle may be difficult to replace promptly. The deficiency in heavier supporting weapons limits the kinds of combat, especially the defense or attack of organized positions, which it should be called upon to undertake. While mounted action may be feasible under favorable conditions, horse cavalry units habitually dismount to engage in combat, conceal their horses, and fight as infantry.



Plate 22. Cavalry on the March.
(Photo, U. S. Army Pictorial Service.)

Cavalry Missions. Cavalry, whether horse or mechanized, should be assigned missions in accordance with its characteristics. Since its dominant characteristic is mobility, assigned missions should require this trait. Furthermore, adequate measures must be observed to retain this mobility. Missions which may be performed by other available troops should usually be avoided as a means of conserving cavalry for the time when other forces will not

serve so well. The two types of cavalry may operate in conjunction with one another or independently of one another. Horse cavalry is especially suited to combat in which its mobility may be utilized to fullest advantage. It is not well suited for attack of an organized position or for a sustained defense of a position. Mechanized cavalry is well suited to deliver a decisive blow at a critical stage of an attack by other forces, for wide encircling movements to strike the lines of communication of hostile forces and disrupt their supply and communication facilities, and for attack of hostile mechanized units.

Horse cavalry may be used on independent missions in large units such as a cavalry division or cavalry corps, or it may be employed as a reinforcing unit of an infantry division or corps. In the latter case units less than a division, as appropriate to the conditions to be expected, would be attached as required. Reinforcing cavalry units are especially useful in open warfare for flank protection, for security missions, for delaying operations, for prevention of hostile ground reconnaissance, for intervention in the decisive stage of a general attack, and in pursuit.

Reconnaissance. Cavalry is especially well suited for reconnaissance missions. Acting alone it can search areas far to the front or flanks to determine the location, strength, and disposition of hostile forces. In conjunction with air service it can maintain contact with hostile forces whose positions have been discovered from the air and search areas over which air reconnaissance may not be entirely effective.

Counterreconnaissance. The purpose of counterreconnaissance is to prevent effective hostile reconnaissance by ground forces. Often the mission assigned to cavalry for this purpose is to prevent hostile reconnaissance beyond a specified line. It is disposed along an extended front in points of good observation and in positions blocking roads and defiles.



Plate 23. Combined (Mounted and Dismounted) Action, Showing Pivot, Maneuvering Force, and Reserve.

Security. Cavalry units may be used in the service of security of larger forces while in march or bivouac. In the execution of this mission they search areas well to the front of the main force to make certain that large hostile forces are discovered and engaged. While this does not relieve the main force of providing its own security measures, it adds greatly to the safety against hostile attack in force.

Delaying action. Cavalry is well adapted to engage large hostile forces to effect delay. It can deploy on a relatively wide front, engage approaching hostile columns with fire, and force them off roads into deployed formations and into position for attack. It can then move rapidly to new positions in rear and repeat the action without becoming decisively engaged. By this process hostile reinforcements may be kept out of the main engagement, or time may be gained to permit the main force to complete a projected operation such as a retirement, occupation of a defensive position, or other action, without enemy interference.

Pursuit. Cavalry is especially well adapted to pursuit. A defeated enemy will seek to withdraw from contact, retire to a place of security, and reorganize for further action. At this stage they are most vulnerable to final defeat and destruction. Cavalry units may move rapidly to harass their flanks or move to key positions in their rear and block the retreat, thus permitting other forces to complete their destruction.

Attack. In advancing to the attack cavalry units move mounted until circumstances require dismounted action. After that point the mounts are concealed and the units operate in a manner similar to infantry units of comparable strength. The led horses are advanced by bounds as the advance progresses in order to have them available for use when required. As the characteristics of cavalry make it more suitable for attack by envelopment than by penetration, it may employ rapid mounted maneuver to reach suitable attack positions from which to attack by dismounted action. (See Plate 23.) In an attack of hostile infantry, cavalry seeks to avoid the enemy's greater power and, by utilizing its superior power of maneuver, strikes where the defender is least prepared to resist. A noteworthy capability of cavalry is action with widely separated detachments without fear of defeat in detail because of the speed with which units can concentrate or move away from contact if such action is indicated.

Defense. Cavalry is well adapted for missions involving seizure of a position and its defense pending the arrival of other forces. It is not well adapted for defense of a position during a prolonged period.

Support of Other Arms. Cavalry units are organized into brigades and divisions. In combat they require the support of artillery, engineers, and signal troops, and of the air corps for distant reconnaissance, liaison, control, and communication. Likewise, the cavalry division needs the essential services performed by the quartermaster corps for supply and transportation, and the services of ordnance and medical units.

Organization of the Horse Cavalry Regiment. The regiment of horse cavalry consists of the following components:

Regimental headquarters and band.

Headquarters and service troop.

Machine-gun troop. This organization consists of three platoons armed with the caliber .30 machine gun, each of four machine guns, and a special weapons platoon with four caliber .50 machine guns, two 60-mm mortars, and nineteen M1 rifles. This troop is at the disposal of the regimental commander for the support of the squadrons in contact with an enemy.

Special weapons troop. Inactive in peace, this troop would receive the special weapons platoon of the machine-gun troop and one additional platoon of caliber .50 machine guns.

Rifle squadron. A rifle squadron consists of three rifle troops, each having a troop headquarters, three rifle platoons, and a light machine-gun platoon. The regiment has three squadrons, one of which is inactive during peace. Squadrons are designated by number, 1st, 2d, 3d. Rifle troops are designated by letter, in one series throughout the regiment, as Troop A, Troop B, Troop C.

Cavalry Mechanized Units. The cavalry arm has made valuable contributions to the progress and developments of mechanization in our service. During the summer of 1940 the War Department directed the formation of the armored corps to absorb the mechanized cavalry brigade, which formed the nucleus of one armored division, and the light and medium tank regiments of the infantry arm, which formed the nucleus of another. The horse cavalry continues to make extensive use of mechanized reconnaissance units, such as scout cars, and its service elements are strongly motorized.

FIELD ARTILLERY

Mission. Field Artillery has a dual mission in battle. *First*, it assists infantry or cavalry units in contact with an enemy by engaging its great fire power against those targets most dangerous to the supported troops. In some instances this involves adding artillery fire to the fires of infantry or cavalry weapons directed upon a common target in order to develop fire superiority. *Second*, by the use of its range it gives depth to combat by firing upon targets beyond the range of infantry or cavalry weapons such as the hostile artillery

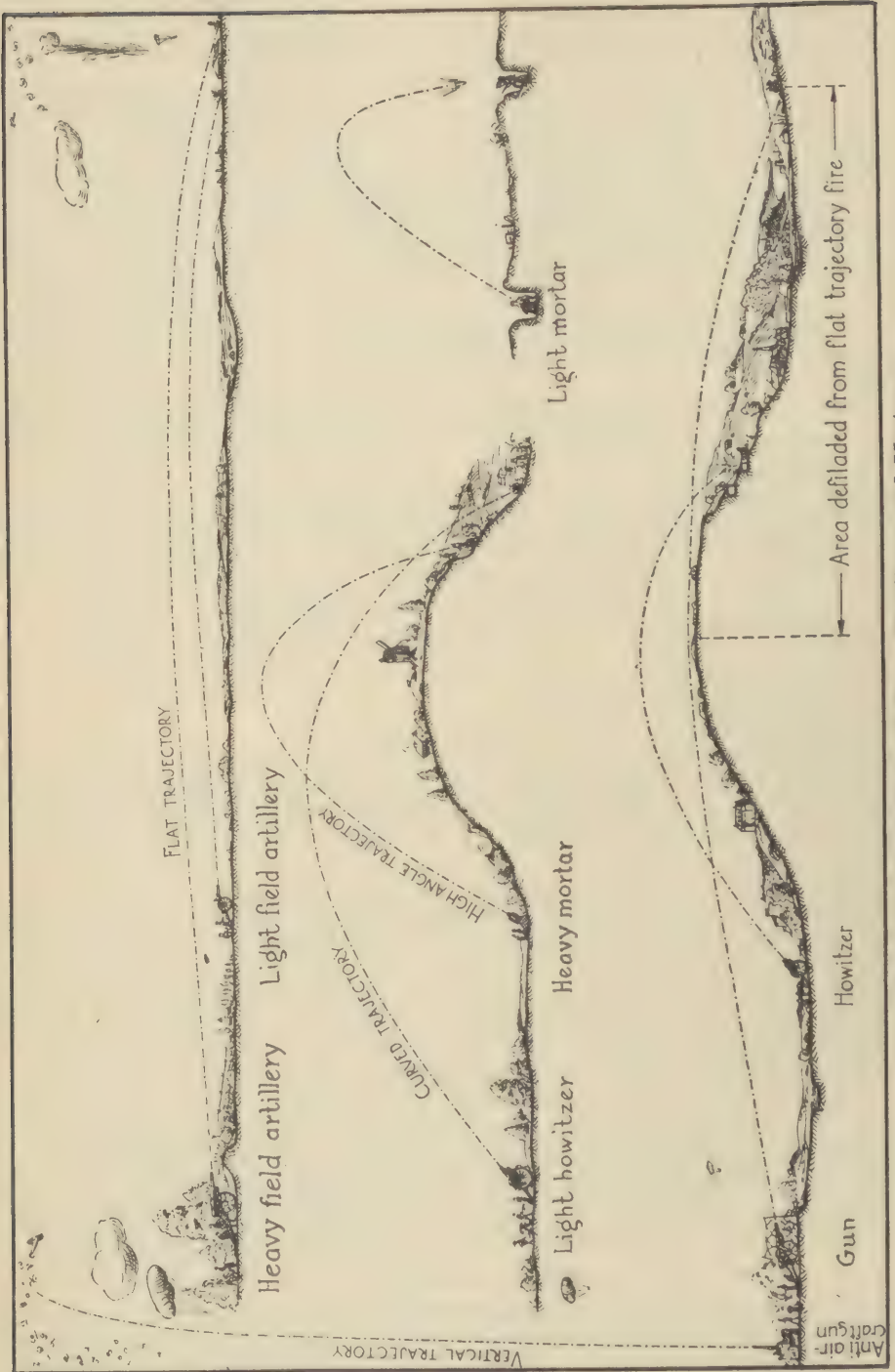


Plate 24. Trajectories of Guns, Howitzers, and Mortars.

(counterbattery fire), his reserves whether on the march or in bivouac, and his agencies for command, supply, and communication.

The division or higher commander is able to use the artillery as a powerful tool to affect the outcome of battle as it progresses. Because of the considerable ranges at which it can fire effectively and the speed with which the direction of fire can be shifted, fires may be concentrated at any desired point throughout a zone of great width and depth. Therefore, as targets are discovered or new threats develop, at least a portion of the artillery may shift to engage them.

Characteristics of Artillery. Artillery acts by fire alone. It is especially useful against exposed hostile personnel, particularly when it is in compact formations. It is able to destroy targets which are invulnerable to infantry or cavalry weapons such as concrete emplacements, stone houses, cellars, bridges, and protected shelters. Plate 24 shows the trajectories of the artillery weapons. It has the ability to converge its fire, from many widely separated positions, to obtain an overwhelming hurricane of fire with violent surprise effect upon one critical or sensitive point of the enemy's organization. Artillery positions are relatively stable, since by making use of its capability of delivering fire at long ranges it can continue to provide support for advancing troops by advancing only its personnel in observation with their communication facilities. Its moral effect upon the troops supported is a valuable by-product.



Plate 25. 75-mm Gun, Truck-Drawn Model.

Field artillery has definite limitations. It requires time to occupy and organize a position, establish communications, obtain and compute fire data, and be ready to open fire. When artillery units occupy positions under cover of darkness it will require approximately one hour of daylight before well coordinated supporting fires can be delivered. The problem of ammunition supply is extremely important, and conditions may be present which **make** it difficult. Artillery requires transport, and the speed and ease of displacement is dependent upon road conditions, terrain, and weather. It is vulnerable to hostile artillery fire when its positions can be observed; it is especially vulnerable on the march. It acts by fire alone, and movement by artillery units is solely to reach positions from which more effective fire can be delivered upon appropriate targets. For these reasons it cannot act as an independent, self-sustaining arm.

Control and Adjustment of Artillery Fire. Accuracy of artillery fires is greatly increased

when the area of burst is noted by an observer who communicates data so that corrections in laying of the pieces in direction and elevation may be made. The observer may be in a favorable ground location, in an observation balloon, or in an observation airplane. Communication may be by telephone, telegraph, or radio. Unobserved fire may be delivered, such as fire delivered from data computed from a map, but it is less effective and requires larger expenditures of ammunition to obtain comparable results.

Classification of Artillery by Caliber. Artillery is classified by caliber as light artillery, medium artillery, and heavy artillery.

Light artillery includes 75-mm and 105-mm weapons. (See Plate 25.) 75-mm artillery is available in three types: the 75-mm pack howitzer, the 75-mm howitzer, and the 75-mm gun. The maximum effective range of this type is, in general, approximately 8,000 yards for shell and somewhat less for shrapnel. The weight of the projectile is 15 lbs.

The maximum effective range of the 105-mm howitzer is 10,500 yards with shell and 6,500 yards with shrapnel. The weight of its projectile is 33 lbs.

Light artillery may be animal-drawn or truck drawn. However, the 105-mm howitzer is entirely truck drawn.

Medium artillery includes only the 155-mm howitzer. (See Plate 26.) Its range is approximately 10,500 yards with both shell or shrapnel. The weight of its projectile is 96 lbs. It is truck-drawn.



Plate 26. 155-mm Howitzer.

Heavy artillery consists of the 155-mm gun (See Plate 27.) and the 240-mm howitzer. The range of the gun is 15,000-20,000 yards depending upon the type of projectile; the howitzer has a range of 14,000 yards. The weights of the projectiles are 96 lbs. and 346 lbs., respectively. Both weapons are tractor drawn, and both require several hours to emplace for firing.

Characteristics of Artillery Ammunition. Artillery ammunition is available in shrapnel, high explosive shell, chemical shell, and smoke shell.

Shrapnel consists of a case filled with round balls, or bullets, and a fuze. The fuze may be set so that explosion occurs at the desired range from the gun. The explosion releases the bullets so that they strike the ground in the area of the target. The case and fuze are also effective. The size of the effective area depends upon the elevation of the projectile above the ground at the time of burst, and the range—the lesser the range, the flatter the trajectory and the longer the effective area. At a range of 2000 yards the effective area is 72 yards in length. At 6000 yards it is 43 yards in length. This ammunition is used against exposed personnel.

High explosive shell may be set to burst on impact, or at a slight interval after impact to obtain the maximum effect of penetration, or to burst in the air. Its effectiveness is obtained from the shell fragments and from the force of the detonation. An air burst of 75-mm shell has an effective radius from fragments to a depth of 5 yards and a width of 30 yards, with large fragments effective to a radius of 150 yards. Medium artillery is effective to 9 yards, 40 yards, and 300 yards, respectively.

Chemical shell is filled with toxic chemical agents which are liberated on impact.

Smoke shell is filled with a non-toxic chemical which develops a dense smoke cloud on impact in order to prevent hostile observation and aimed fire.

Classification of Artillery by Assignment. *Division artillery* consists of light and medium artillery. The type of division determines the size of its artillery component. The division made up of three infantry regiments (the "triangular" division) has three battalions of light artillery (105-mm howitzers) and one battalion of medium artillery (155-mm howitzers). A division containing two brigades of infantry has one medium artillery



Plate 27. 155-mm Gun, Heavy Field Artillery.

regiment of 155-mm howitzers and two light artillery regiments of 75-mm guns. Reinforcing artillery units may be attached to divisions for tactical missions; such units are classified as division artillery while so attached.

Corps artillery includes medium artillery and heavy artillery organized as a brigade. Additional units may be attached from higher echelons. Tactically, the term *corps artillery* refers to those units, organic or attached, which are not attached or reallocated to its several divisions, hence, that which is retained directly under corps control.

Army artillery includes units which can support the army as a whole; its organizations are not fixed.

GHQ artillery in reserve includes field artillery of various categories for allocation to subordinate units in accordance with their special needs. For example, light artillery may be allotted so that a division is temporarily reinforced with one or several additional regiments from GHQ reserve.

Terms Used in Assignment of Missions. *Direct support* artillery includes those units given the mission of providing support for a designated subordinate infantry unit. It establishes liaison and cooperates closely with the supported unit. However, it remains under centralized control in contrast to attached units described below.

General support artillery is given the mission of supporting an entire unit such as the division, rather than a single subordinate infantry unit.

Attached artillery consists of units temporarily attached to another command to serve under the orders of the commander of the unit to which attached. Illustrative of such use, a light artillery regiment may be attached to an infantry brigade on an independent mission, or a mission which removes it from the proximate area of the division as a whole.

Artillery Firing Positions. Artillery units are habitually emplaced by battalion units as fire is usually controlled by battalion. The batteries of a battalion may be separated by short distances or by as much as a mile, according to the mission and terrain. Guns of a single battery will tend to be compactly placed. Battalions of a regiment may be widely separated.

Battery positions should be in defilade from hostile ground observation and concealed against observation from the air by natural cover or camouflage.

In support of an attack, artillery units tend to be placed well forward with respect to the line of departure so that fire support may be continued without change of position until assault units have advanced a considerable distance. A distance of 1,500 yards in rear of the line of departure is reasonable for purposes of visualization. In support of a defense, artillery units in support of the battle position will be emplaced in rear of the regimental reserve line which itself is located in advance of the dominant observation in the locality. Units are distributed laterally so as to provide fire support to the flanks as well as to the front. Batteries of a battalion are distributed in depth so that some can fire far to the front and others can fire in support of the regimental reserve line and in front of the battle position. In this manner the enemy continues to encounter effective artillery fire after entering a position.

In the defense of a position with open flanks, some artillery may be held "in readiness." This means that it is not in firing position, but occupies a central location with respect to the battle position so that it can move quickly to engage the hostile attack from whatever direction it may come. Several positions should be selected and organized, anticipating all hostile capabilities for attack, so that prompt delivery of fire may be obtained.



Plate 28. Division Artillery (Triangular Division).

Organization. The detailed organization of a field artillery regiment is subject to a considerable variation. The caliber of the weapon with which it is equipped and the composition of the division of which it forms a part are the controlling factors.

For purposes of illustration the organization of the division artillery, triangular division, is shown by chart in Plates 28, 29, and 30. The battery of artillery is commanded by a captain and is similar to a company as a term.

The Infantry-Field Artillery Combat Team. The action of infantry and field artillery is so coordinated that the infantry and the field artillery of the infantry division function as a team. Infantry may be said to contribute the elements of maneuver, deception, and surprise. Artillery contributes the element of power, the "muscle" of attack or defense.

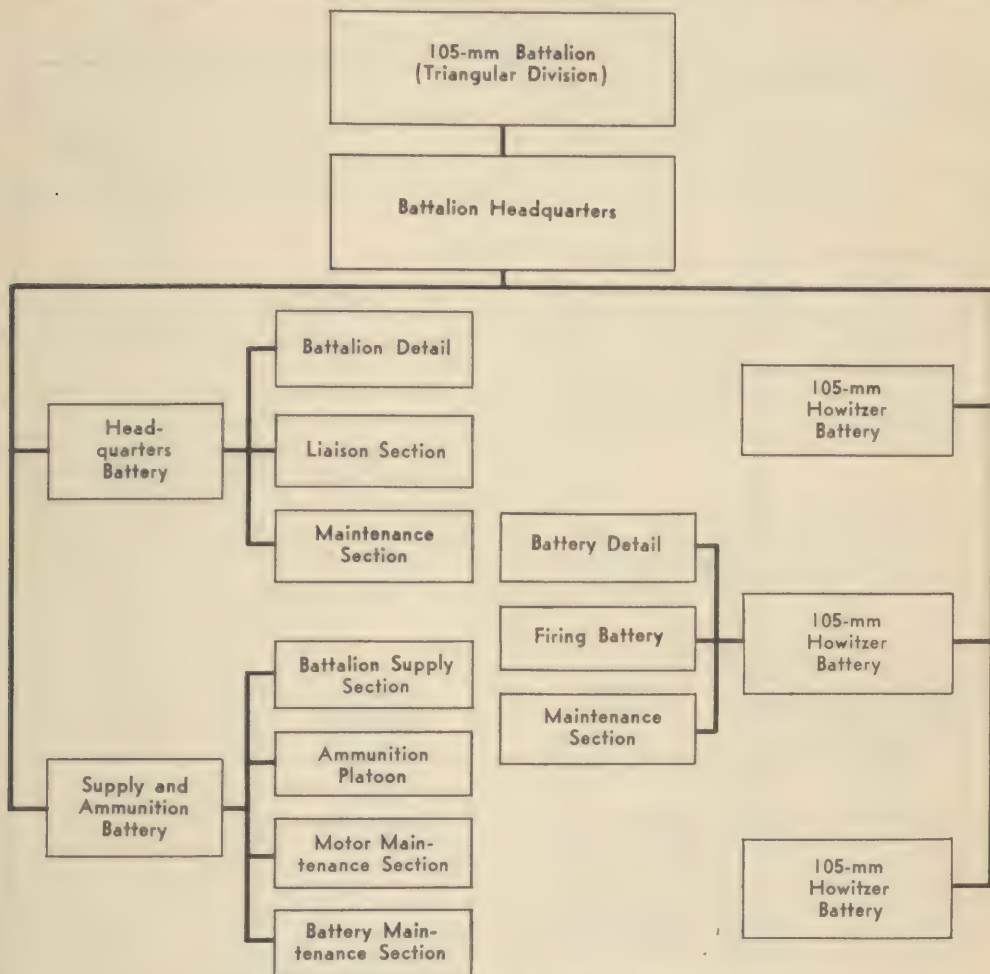


Plate 29. Battalion, 105-mm Howitzer, Light Artillery.

The effectiveness of this team is developed by the assignment of specific missions to the artillery and by close liaison between infantry and artillery commanders. The commander of the field artillery unit will maintain close touch during combat with the division commander; often his command post will be near the division command post. A light artillery regiment is often assigned the mission of providing direct support of an infantry brigade. When this is the case the artillery regimental commander will maintain close touch with the infantry brigade commander. Similarly, an artillery battalion may be in direct support of an infantry regiment. Each artillery battalion has personnel to furnish liaison detachments to accompany the troops supported. It is desirable that such a detachment accompany each assault battalion in attack, and during the defense each battalion on the main line of resistance. These detachments include an officer, the necessary enlisted personnel, and communication facilities. The officer advises the infantry battalion commander as to ways in which the artillery may be used to advantage, transmits requests for fire with the location of the targets, and may observe the fire in order to send back information to

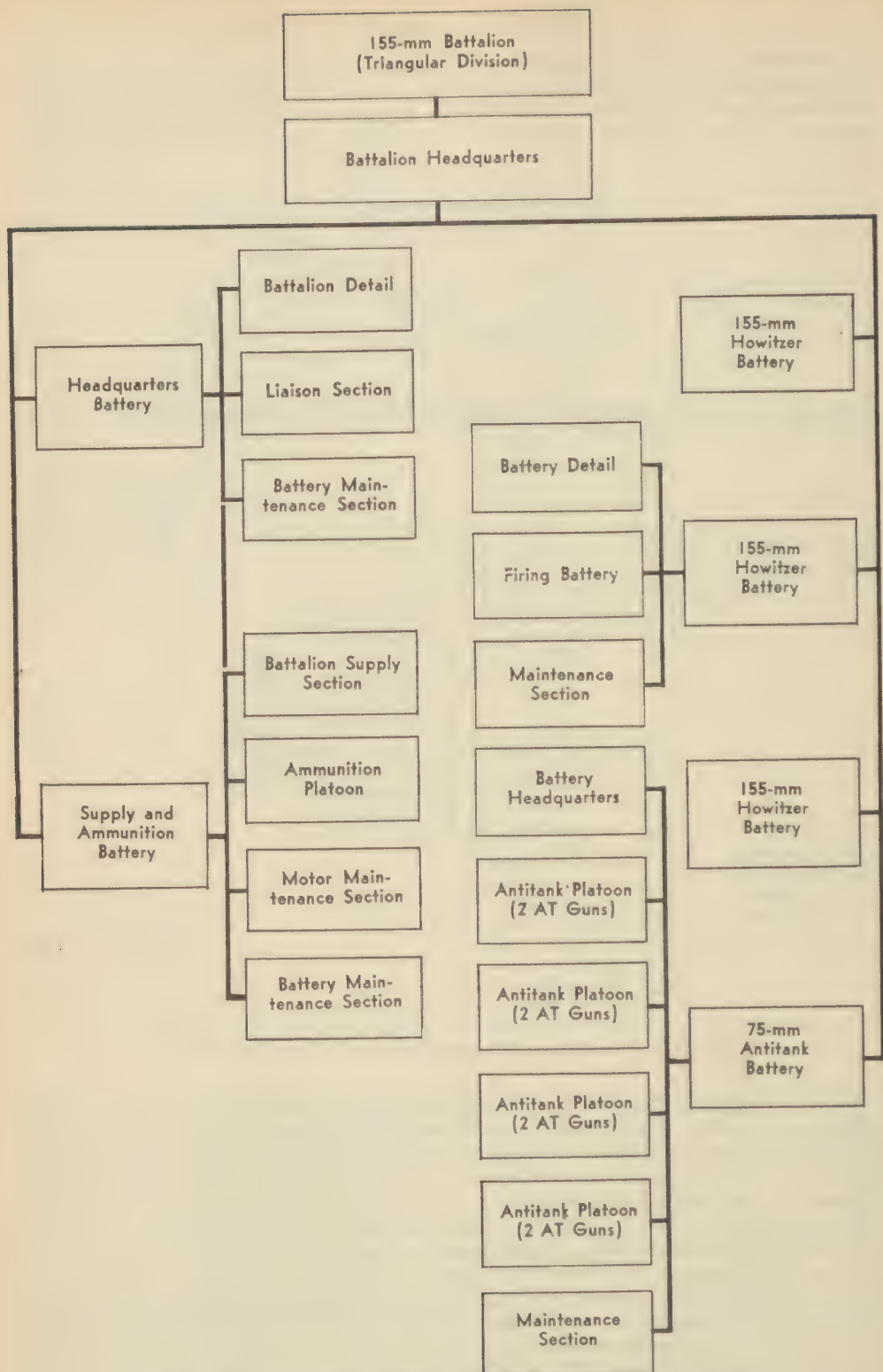


Plate 30. Battalion, 155-mm Howitzer, Medium Artillery.

increase its accuracy and effectiveness. By these means joint action is obtained. The flexibility of artillery fires, and the ease with which it may be shifted in elevation and direction, permit it to assist adjacent units which may have a temporary need for greater fire support.

Medium artillery may likewise be assigned missions in direct support, but it is more usual for it to be held in general support of all units in the division area. When so used it may support light artillery regiments, adding to the density of those fires, or engage targets beyond the range and powers of light artillery. The distinction is that it will receive requests for fire from the light artillery regiments rather than from supported infantry units. It will also engage targets which are discovered by observers in observation balloons, observation airplanes, as directed by the division commander, or other sources.

The problem of developing effective, closely-knit infantry-artillery teams is of the greatest importance. Upon its successful accomplishment may hinge success in battle.

ENGINEERS

Purpose of the Engineer Component of Large Forces. A large field force finds constant need for units trained and equipped to execute construction and maintenance missions. The corps of engineers is charged with the execution of these tasks. It will be charged with the maintenance of existing facilities needed by the force, particularly those which lie within the theater of operations. It will be called upon to build entirely new installations which are required, particularly of lines of communications. It must be able to perform all of the special engineering tasks required in battle or campaign by large forces such as infantry divisions, cavalry divisions, corps, and field armies.

The diversity of tasks requires that engineer units be trained and equipped to accomplish each of these special purposes. *General engineer units* are able to undertake a wide variety of construction tasks. *Combat engineer* battalions or regiments are included within this classification. *Special engineer units* are trained and equipped for the execution of tasks within a restricted technical field.

Combat engineers of infantry or cavalry divisions participate in battle. The execution of assigned missions may include contact with the enemy as, for example, in the execution of demolitions to impede a hostile advance. They may be used at a critical stage in combat, and their orders will frequently include a requirement that they be prepared to assemble at a prescribed area within a definite time limit. They are trained to operate as infantry, particularly as infantry rifle companies.

Specific Missions of Combat Engineers. Combat engineers are able to facilitate the advance of friendly troops. This requires the maintenance and repair of roads and rail lines within the division or corps area. This is often a difficult task because of the heavy overload which these facilities may be called upon to bear. It will include the repair of bridges and culverts which may have been damaged by the enemy. Motorized and mechanized units are especially dependent upon engineer units for work of this nature during an advance in hostile territory.

In addition to facilitating the advance of friendly troops, engineer units impede a hostile advance. This includes such tasks as demolition of bridges, roads, railway facilities, the construction of obstacles such as road blocks, tank barriers, mine fields, and barbed wire entanglements. It includes the marking out of defensive positions under some situations and may include phases of such construction.

They provide for the shelter and comfort of friendly troops by providing for the supply of water, the operation of utilities within the theater of operations, and construction or improvement of facilities necessary for the health and welfare of troops.

Map reproduction is an important function of combat engineers so that an adequate supply of maps may be available. This work must be done rapidly and accurately by methods appropriate to service in the field.

The organization of a position requires the use of large numbers of tools, picks and shovels particularly, which are not included in the equipment of infantry units. The division engineer unit would then distribute these tools from its own supplies and, if these were insufficient in number, would secure additional quantities from engineer depots.

Units within the division have need of engineer support in the execution of their routine

tasks. The quartermaster may need improvement of an area at the railhead to permit a large number of trucks to load or unload simultaneously. Improvement of an area about an ammunition refilling point may be necessary. Rains may make an important road impassable at some points. The division surgeon may need assistance from the engineers in the vicinity of the hospital station. The air officer may require construction or improvement of an advanced landing field. Water for men and animals may have to be pumped, made potable for drinking, transported, and distributed. There are many other tasks similar in nature. Their nature indicates the importance of the missions which are regularly performed by engineer units.

A cursory examination of terrain structure indicates the importance of rivers in military operations. Destruction of bridges by a retreating enemy creates a difficult obstacle. River crossing operations are common, and their execution difficult. Engineer units equipped with pontoons and assault boats are equipped and trained for these missions.

Organization and Equipment of Combat Engineers. A company of combat engineers consists of a company headquarters and two platoons. Each platoon has a platoon headquarters, an operating section, and a tool section. The battalion of the division engineer regiment has three such companies. The regiment consists of regimental headquarters, headquarters and service company, and two battalions.

Each company has one light tractor and one 4-ton truck used as the tractor carrier. It has four 1½-ton dump trucks, and two ½-ton pickup trucks. Its arms consist of rifles, automatic rifles and pistols.

SIGNAL CORPS

Mission. The signal corps operates the message center and installs and operates the communication facilities for the headquarters of divisions and higher echelons. The communication means include wire circuits and radio nets, the wire being used for telegraph, teletype, and telephone. The maintenance of these facilities under the conditions imposed by combat is included in the mission.

The extent to which communication facilities are maintained by a unit having signal corps personnel, such as the infantry division, is as follows:

(1) To, but not including, the headquarters or command posts of the next subordinate unit and to the attached units. This would require the division signal company to install communication facilities to the headquarters of the infantry and artillery brigades (if the division concerned includes the brigade in its organization, otherwise to the separate regiments); to the headquarters of the engineer regiment or battalion; to the unit in division reserve; to the hospital station; to the headquarters of attached units such as antiaircraft artillery, chemical units, or units of the Air Corps.

(2) To the headquarters of the corresponding unit on its left, unless higher authority prescribes otherwise, in order that lateral communications facilities may be available.

Organization. The signal company, infantry division, consists of a headquarters platoon, an operating platoon, and a construction platoon.

The operating platoon has a message center section which establishes and operates the message center at division headquarters or at the division command post, a radio section, and a telegraph and telephone section.

The construction platoon is provided for the installation of wire communications. It includes 2 wire construction sections.

The company has 6 radio sets, 60 telephones, 6 telegraph sets, and 60 miles of field wire.

Subordinate units of the division are provided with personnel to perform the same missions under identical principles. The difference lies in the fact that the personnel is not furnished by the signal corps, but is a part of the organic strength of the units concerned. The signal corps, however, exercises technical control over the various signal agencies of a command.

For the purposes of illustration, the infantry regiment at peace strength has a communications platoon in the headquarters company consisting of 1 officer and 70 enlisted men. This platoon is divided into a platoon headquarters, a regimental section, and a battalion section for each of the three battalions. This unit installs the message centers and com-



Plate 31. An Infantry Regimental Command Post.

munication facilities for the regimental headquarters and the battalions and is responsible for their operation.

Responsibility of the Commander. Communication facilities provide the necessary channels through which a commander receives information and directs the action of his troops. Although the tempo of modern combat has in no sense reduced the necessity for a commander to visit his troops, confer with subordinate commanders, and observe in person the execution of assigned missions, the very size and scope of operations place an increasing burden on these facilities. Reliable and continuous communications are vital to success in battle. Since communications are an important agency of command, it follows that a commander is responsible for their efficient operation. The signal corps unit or communications personnel of a command is merely the agency which executes the will of the commander in supplying this need.

The commander of each unit exercises supervision over the signal systems of subordinate units in the same manner as for all other functions. This supervision may be exercised by the signal officer, upon the approval of the commander, through the normal channels of command. Technical control and coordination is usually exercised directly between the signal officers concerned.

The Message Center. A *command post*, which includes a message center, is defined as a control locality at which the tactical staff does its works and through which the commander may be reached. A *message center* is a signal agency established at a headquarters or command post which is charged with the receipt, transmission, and delivery of all messages except those handled by the postal service or those messages transmitted from the originator or addressee by telephone or personal agency. It operates under the unit signal or communication officer. The message center moves with its headquarters.

An *advance message center* may be established at an advanced location for the convenience of the commander and staff when operating well forward of the message center.

Installation, operation, and maintenance. The installation, operation, and maintenance of communication facilities is included within the mission of signal or communication agencies. Under the conditions of battle this is often a difficult operation, especially when movement is rapid. It is a principle that communication must be continuous, regardless of the rapidity of movement during the conduct of operations.

Axis of Signal Communication. During combat, when the movement of a command post to successive locations is contemplated, as in an attack, successive locations of the command post are announced in the direction of movement. This is called the axis of signal communication. This practice facilitates the coordination of communication agencies and assists in their ready location as the action proceeds.

Messengers and Messenger Service. The requirements for communication in combat lead to the use of all types of messengers, such as: runners (foot messengers), horse messengers, motorcycle messengers, motor messengers, using combat vehicles, airplane messengers, bicycle messengers, and homing pigeons.

A *scheduled messenger service* is maintained between units or establishments whenever such service will reduce the personnel required without seriously delaying transmission. This class of service is usually operated on a time schedule.

Visual Signals. While the introduction of radio and wire communications has reduced the need for communication by visual means, messages may be transmitted by signal lamps, pyrotechnics, flags, and panels. Pyrotechnics are used from the air and from the ground to send short, prearranged messages such as a call for artillery fire. Panels are used to signal from the ground to aircraft for such purposes as marking the position of assault units or identifying a unit in a locality.

Communication Facilities of a Medical Unit. The medical units of a division have no wire or radio communication facilities. They are provided with personnel to operate a message center at the command post of each unit. Communication is maintained by transmission of messages by vehicles in the execution of other missions, by messengers, or by utilizing the communication facilities of the most convenient unit of the force supported. The clearing station will often be provided with telephone communication by the division signal officer.

Definition and Classification of Messages. The term "message," as used herein, includes all instructions, reports, orders, dispatches, and documents of whatever nature whether in secret or in clear text, and also all photographs, maps, overlays, or sketches transmitted by field agencies of signal communication, as distinguished from those transmitted by mail or commercial agencies. (A telephone conversation between two persons over a field wire system is not classed as a "message"). Certain messages, because of their importance, should be given priority over others in transmission. For this reason messages are divided into the following classification: *urgent, priority, and routine.* Messages are considered routine by transmitting agencies unless the writer specifically classifies them as urgent or priority by writing the appropriate word on the face of the message. The urgent classification is reserved for those messages that require the greatest speed in handling. When so marked, the message will be sent immediately upon receipt by the transmitting agency unless another urgent message is being sent. Priority messages are given precedence over all routine messages waiting to be sent. Commanders should resort to the preferred message only in cases of actual necessity, as indiscriminate use of this device decreases its effectiveness. No greater priority should be demanded for a message than its relative importance warrants.

THESE SPACES FOR MESSAGE CENTER ONLY		
TIME FILED (1)	MSG CEN NO (1)	HOW SENT (1)
(2) MESSAGE (3)		
(4) No. <u>8</u>	DATE <u>23 July 40</u> (5)	
(6) To <u>CO 1st Inf</u>		
<u>Your regiment moves by truck to</u> (7)		
<u>BROWNS MILLS at 3:00 AM 25 July.</u>		
<u>Trucks report for loading at</u>		
<u>CR 493A at 12:00 midnight. Orders</u>		
<u>later for employment of 1st Inf</u>		
<u>upon arrival destination.</u>		
(8) <u>CG 1st Div</u>	<u>6:00 PM</u> (9)	
OFFICIAL DESIGNATION OF SENDER TIME SIGNED		
(10) <u>Joe Wilson Maj S-3</u>		
SIGNATURE AND GRADE OF WRITER		

Plate 32. Form M-105 Message Blank Correctly Filled Out.

The full size of the message sheet is 5½ x 4¾ inches.

Preparation of Field Messages. The transmission of field messages is facilitated by a uniform arrangement of their contents. Irregularity in the address or authorization delays transmission and increases the chance of error. *The inclusion of the correct date and hour of origin of the message is essential* to proper evaluation by its recipient. Serial numbers on the messages aid in control of traffic. Therefore, special forms for field messages are prepared, bound in books, and issued to the service. These forms have definite places for all the items mentioned above, a space for the text or body of the message, and spaces for the use of transmitting agencies.

In writing field messages be brief, concise, but above all legible and accurate. Adopt a telegraphic style as if each word were being charged for at commercial rates but do not omit anything which is essential to a full and complete understanding of the message by

the recipient. Use only the authorized and generally understood abbreviations. Be careful of such words as "right" and "left" when compass directions as "east," "west," "north," or "south" are more specific. When a message is written, read it from the viewpoint of the person to whom it is to be delivered, assuming that he has normal intelligence, in all probability a compass, but no "Ouija Board." If it still makes sense and tells the complete story, it is ready for transmission.

The Field Message Book. The field message book, Type M-105, is the most recently adopted message book for general use, and is the type carried by infantry officers, noncommissioned officers, and any other personnel who have occasion to write field messages. The book is designed to fit the shirt pocket. Each message sheet in the book has a carbon back, except the tissue sheets intended for the writing of messages to be sent by pigeon. In addition there are vellum sheets for sketches or overlays.

To prepare the book for the writing of a normal message, the cardboard stop is inserted between the third and fourth unused message sheets, in order to block off the remaining message sheets. One writing thus makes an original and two copies of the message. The second copy is retained in the book for the writer's file or reference. The original and the first copy are dispatched to the message center, the original for transmission and the first copy for temporary file at the message center. At the proper time, the staff officer charged with the preparation of the unit journal should incorporate the temporary file copy in the journal.

Plate 32 shows a message blank correctly filled out by the writer. The numbers in parenthesis refer to the following notes:

- (1) Not to be used by the writer.
- (2) The writer may enter here a preferred classification, such as urgent or priority.
- (3) The writer ordinarily does *not* indicate the agency of transmission. If he desires physical transmission, he should enter here: "by Msgr."
- (4) The *writer's* own message number. Message numbers run serially through the 24 hour day. The first message written after 12:00 midnight is always No. 1.
- (5) The date is always written in the order: day, month, year.
- (6) Insert the *official designation* of the person addressed, not "Colonel X. Y. Jones." Col. Jones may have become a casualty, but there is always an incumbent commanding officer of the 1st Infantry. Add the actual location only when necessary to insure delivery. Do not use telephone code names as an address.

(7) *Write plainly*, using a pencil that will make clean-cut carbon copies. Print proper names (except signature and grade of writer) and code or cipher groups in CAPITALS. Poor writers should print the entire message.

(8) This is the official designation of the authority for the message.

(9) The time signed is often as important as the date. It may be written as shown, or simply as "6:00P," omitting the "M." "12:00 AM" and "12:00 PM" are confusing. It is better to write "12:00 Midnight" or "12:00 Noon."

(10) This is either the signature of the sender of the message or the person authorized to write the message for him. Thus, in the example given, Captain Joe Wilson is authorized, as a staff officer, to write messages for the Commanding General, 1st Brigade.

Before Captain Joe Wilson turns the above message over for transmission he *reads it carefully*, remembering that "If a message *can* be misunderstood it *will* be misunderstood."

COAST ARTILLERY CORPS

Mission. The *Coast Artillery Corps* is characterized by the great fire power it can deliver primarily against naval and aerial targets. Its armament comprises seacoast artillery, antiaircraft artillery, and submarine mines.

The missions of the Coast Artillery Corps are to attack enemy naval vessels by means of artillery fire and submarine mines, and to combat hostile aircraft by means of fire from the ground.

Cooperating in coastal frontier defense with the Navy off shore, the Coast Artillery Corps mans and serves the harbor defenses established in time of peace and augmented in time of war. These harbor defenses are highly organized and strongly protected

localities, organized administratively and tactically for the defense of a harbor or other water area.

Seacoast Artillery. *Seacoast artillery* comprises all the artillery, whether fixed or mobile, employed against hostile naval vessels. It is classified according to caliber as primary armament which includes cannon of 12-inch or greater caliber, and secondary which includes all other armament. (See Plate 33.)

Seacoast artillery has the same general characteristics of fire as Field Artillery except for its greater power and range, and the armor-piercing ability of its projectiles which, in general, are not suitable for use against land targets. It is provided with special equipment to facilitate the delivery of accurate fire on moving targets at sea.

Fixed seacoast artillery secures protection from naval and air attack by fortifications and other permanent structures; its operation and service are greatly facilitated by mechanical means; its stability permits great accuracy of fire. The provision of permanently installed communications, stations and fire control equipment makes possible the establishment of a common fire direction to exploit the flexibility of artillery fire to the maximum extent.



Photo by U. S. Army Signal Corps.

Plate 33. Coast Artillery 16-Inch Harbor Defense Gun.

Mobile seacoast artillery comprises *railway* artillery and *tractor-drawn* artillery. Both types combine strategical mobility with a limited tactical mobility and require a considerable time for emplacement. Mobile seacoast artillery provides additional gun fire for existing harbor defenses and is used in conjunction with other forces to protect harbors or coastal areas for which no permanent defenses have been provided.

Seacoast artillery is organized into groups and groupments in order to develop the maximum fire power and provide efficient fire direction.

Antiaircraft Artillery. The general mission of the *antiaircraft* artillery is to combat hostile aircraft. For this purpose, it is equipped with antiaircraft guns, machine guns,



Plate 34. 3-Inch Coast Artillery Antiaircraft Gun.

searchlights, sound-locators, and equipment required for observation, fire-control, and signal communication. These means of antiaircraft defense are combined in the regiment.

Antiaircraft artillery operates both by day and by night. Because of the mobility of its matériel, antiaircraft artillery lends itself to rapid concentration in critical areas.

Antiaircraft artillery reinforces the antiaircraft measures of other troops and, in co-operation with our own aviation, operates especially against hostile aircraft flying beyond the range of the weapons of other troops. It provides protection for those vital elements of a command most likely to be subjected to hostile air observation or attack. It is employed also in harbor defenses and for the protection of airdromes and other sensitive points in the rear areas.

The establishment of a coordinated antiaircraft defense is facilitated by *centralized control* of antiaircraft units. In some situations, however, such as during an advance, it may be necessary to decentralize control of part of the antiaircraft artillery to protect widely separated units or installations.



Plate 35. 37-mm Coast Artillery Antiaircraft Gun.

An essential agency of antiaircraft artillery is its *intelligence service*. This service gathers and transmits information of the enemy's air activities necessary for the proper employment of the antiaircraft artillery units. It should not be confused with the *aircraft warning service* which is a regional service forming part of a theater, sector, or area, and serving all agencies of antiaircraft defense. The aircraft warning service operates directly under the control of the commander of a sector or area or the theater of operations concerned.

Matériel. The weapons used by antiaircraft artillery consist of the antiaircraft artillery gun, 3 inches or larger in caliber, which is provided for attack of high-flying aviation, the 37-mm antiaircraft gun, and the caliber .50 machine gun. (See Plates 34, 35, and 36.)

The 3-inch antiaircraft guns fire a 12.7-pound projectile to a vertical range of 9,700 yards and a horizontal range of about 14,200 yards. Rate of fire is 25 shots per gun per minute. The total weight of the piece and its carriage is approximately 8 tons.

The 37-mm antiaircraft gun is a highly mobile antiaircraft gun capable of full automatic fire at a rate of 120 shots a minute. Its range is approximately 2,500 yards. Total weight of gun and carriage is 2½ tons.

The caliber .50 machine gun has an effective range of 1760 yards and delivers fire at a rate of 250 shots per minute.

Detection of approaching aircraft, obtaining and computing firing data in time to be of use, and transport of the weapons and equipment requires the following rather elaborate and costly equipment: searchlights, sound locators, stereoscopic height finders, data computers, fuze setters, and fire directors.

Organization. The antiaircraft artillery regiment consists of the following units:

Regimental headquarters.

Headquarters battery.

Gun battalion consisting of battalion headquarters, headquarters battery, and ammunition train; searchlight battery with five platoons, each operating one searchlight and one sound locator; and three gun batteries, each operating four mobile antiaircraft guns and four caliber .50 antiaircraft machine guns, the latter for protection of the battery from attack by hostile low-flying airplanes.



Photo by U. S. Army Signal Corps.

Plate 36. Caliber .50 Antiaircraft Machine Gun.

Automatic weapons battalion consisting of battalion headquarters, headquarters battery, and combat train; one machine-gun battery of three platoons, each operating four caliber .50 machine guns; and three 37-mm gun batteries of four platoons each, each operating two guns.

The regiment is entirely motorized. It has a total of twelve mobile antiaircraft guns, twenty-four caliber .50 antiaircraft machine guns, twenty-four 37-mm antiaircraft guns, fifteen searchlights and fifteen sound locators.

The regiment may be formed into provisional battalions, constituted as may be appropriate to the mission, for temporary attachment or support of other arms, when less than the entire regiment is required by the mission or available for employment.

AIR CORPS

Mission. The general mission of the *Air Corps* is the preparation for and execution of air operations as a part of the field forces.

Characteristics. Military aviation is characterized by an extremely high degree of mobility, the ability to move in three dimensions, and extreme range of fire power. Air

operations may be restricted by hostile counter air force operations and antiaircraft measures, by the availability of air bases, and by adverse weather conditions.

The mobility of aircraft enables them to cover great distances in a short period of time and makes possible their rapid intervention at critical points in a theater of operations and rapid movement between widely separated theaters.

The power of aircraft to move in any direction enables them to maneuver in altitudes beyond the range of ground weapons, to approach terrestrial objectives from such altitudes, and to make deep incursions into enemy territory.

The operating range and fire power of combat aircraft are reciprocal functions and depend upon the distribution of the useful load between fuel and ammunition.

Types of Air Operations. In general, air operations involve three fundamental tactical functions:

Air attack, which is the attack of objectives on the earth's surface by aircraft;

Air fighting, which is the act of fighting between aircraft in flight;

Air reconnaissance and observation, which is the gaining of information through visual and photographic means carried in aircraft.

Types of Aircraft. In accordance with the purpose for which aircraft are ordinarily employed, military aviation is divided as follows: combat; reconnaissance, observation, and liaison; transport; and training and special purpose aviation.

Combat aviation is organized, equipped, and trained to engage in offensive and defensive air operations by air attack and air fighting. Corresponding to the means with which equipped, combat aviation is organized into bombardment and pursuit units. Medium and long-range reconnaissance is performed by bombardment types of aircraft.



Official Photograph, U. S. Army Air Corps.

Plate 37. North American O-47A Observation Airplane.

Reconnaissance, observation, and liaison aviation is organized, equipped, and trained to conduct air reconnaissance, observe fire, gain military information by visual and photographic means, and transmit instructions and reports in accordance with the orders of supported units to which organically assigned or attached. It includes both heavier-than-air aircraft and balloons. Although armed for their own protection, they are not suitable for air attack or air fighting. (See Plate 37.)

Transport aviation is organized, equipped, and trained to carry personnel and cargo. It is indispensable for facilitating the operations of Air Corps units through the rapid transport of personnel and essential items of supply, and is particularly suitable for increasing the mobility of foot troops in an emergency.

Training and special purpose aviation is organized, equipped, and trained especially for the training of flying personnel and for other special purposes not connected with air operations; it is neither suited nor intended for combat use.

Powers and Limitations. A knowledge of the powers and limitations of *combat aviation* is a prerequisite to sound employment. These powers and limitations are derived from the characteristics of its constituent aircraft. These characteristics change rapidly with the development of new aircraft.

Bombardment aviation is characterized by its ability to carry large loads of destructive agents to attack surface objectives. It includes light, medium, and heavy bombardment. (See Plate 38.)



Official Photograph, U. S. Army Air Corps.

Plate 38. Bombardment Airplane, Boeing B-17B, the "Flying Fortress."

Light bombardment aviation constitutes the principal element of GHQ aviation which operates in direct support of ground forces. Its principal weapons are light bombs and chemicals. It is capable of applying these destructive agents to destroy light material objectives, to interdict routes of communication and supply, to render air-dromes temporarily useless, and to attack troops in the open or under light shelter.

Medium and heavy bombardment aviation constitute the offensive power of the GHQ striking forces. They are designed to carry the maximum bomb loads to great distances and to conduct long-range strategic reconnaissance over land and sea. Their principal weapon is the heavy bomb. They rely primarily upon high altitude flying, speed, defensive fire power, darkness, and the cover of clouds for security. They are particularly suitable for the destruction of heavy material objectives. Their radius of action is such that they can strike objectives at a great distance from their base and still find service and security deep in friendly territory.

Pursuit aviation is characterized by its great speed and maneuverability in the air and by its ability to engage in air fighting. It includes interceptor and fighter pursuit. (See Plate 39.)

Interceptor pursuit aviation is designed primarily for defensive missions in the anti-aircraft security of important areas and ground installations, and the protection of ground troops and their observation aviation. It extends protection beyond the range of antiaircraft artillery and its operations are coordinated therewith.

Fighter pursuit aviation has greater range than interceptor pursuit and is designed to accompany and protect bombardment aviation exposed to attack by hostile combat aviation.

Although pursuit aviation is designed primarily for air fighting, it can also be used to attack troops and their transportation.

Balloons constitute elevated observation posts and serve as a means for extending the

field of view under continuous observation. They possess a considerable degree of mobility and can be moved frequently without material loss of efficiency. They are, however, vulnerable to attack by hostile combat aviation and antiaircraft artillery if within range of the latter.

For purposes of observing and adjusting artillery fire, the balloon or the observation airplane is employed, whenever practicable, in preference to the reconnaissance airplane which is provided for and intended to perform reconnaissance missions.

Fire Power. The *fire power* of combat aircraft used in air attack is characterized by its potential concentration and cumulative effect. This effect depends upon the nature and extent of the objective, upon the enemy's measures for antiaircraft defense, and upon the number and characteristics of combat aircraft used against the objective. The constant threat of air attack exerts a strong influence on surface movements and operations.



Official Photograph, U. S. Army Air Corps.

Plate 39. Bell XFM-1 Pursuit Airplane (Multiplace).

Air Fighting. Because of the speed and powers of evasion inherent in all aircraft, *air fighting* is generally of a brief duration and the results are often indecisive. As a result, pursuit aviation is incapable of controlling the air in the same sense that surface forces can control an area. Air fighting will, therefore, be carried on as necessary to limit hostile air operations.

Air Reconnaissance. *Air reconnaissance* and *observation operations* are characterized by wide range and great depth, by the excellence and precision of the air photographs taken, and by the rapidity with which information is obtained and transmitted. They are limited by poor visibility, bad weather, antiaircraft fire, and the opposition of hostile combat aviation.

All aircraft except balloons are equipped with two-way radio; balloons are able to communicate by telephone with the ground. Other means of communication between air and ground are dropped and picked-up messages, pyrotechnics, flares, and other visual signals.

Care and Maintenance. Much of the equipment pertaining to aircraft is of a complex and highly technical nature; its operation requires highly trained combat crews; its

maintenance and repair require mechanics with specialized skill. As a consequence, all aircraft need constant care and maintenance and are vulnerable to air attack both in flight and on the ground. The fatigue of combat crews and the repair and servicing of equipment and matériel require all aviation units to operate from air bases where the necessary facilities are provided for rest, replacement, maintenance, and repair.

The frequency of engagements of the elements of an aviation unit depends upon the urgency of the situation and the demands already made on the particular unit. It is essential that aviation units be conserved in their employment during less active periods of operations so that crews and equipment may be pushed to the limit of endurance during critical phases of operations.

Air Bases. Air bases, suitably located, are essential for the operations of combat aviation. Without a suitable air base from which to operate, combat aviation soon becomes impotent.

An *air base* is an Air Corps command which comprises the landing facilities and the installations for shelter, supply, maintenance, and repair that are necessary to sustain the operations of combat aviation. Such a base will, as a rule, cover a considerable area. Its security requires a wide distribution of base facilities and installations and adequate means for their protection.

Organization. The basic administrative and tactical unit of the Air Corps is the squadron. The group, composed of two or more squadrons, is the principal tactical unit and contains all the essential elements necessary for operation, maneuver, and combat. The next higher Air Corps unit is the wing which may consist of two or more types of aviation but will rarely, if ever, operate tactically as a unit in the air.

Military aviation is assigned to GHQ, to oversea departments, to large units (division and larger units), and to the zone of the interior or other important areas.

GHQ Aviation. GHQ aviation comprises:

Striking forces which operate as strong offensive air units to extend air operations to a great distance from their operating bases.

Defense forces which provide the necessary antiaircraft defense of the most vulnerable and important areas of the zone of the interior.

Support forces which operate in direct support of the operations of the ground troops.

Special forces which meet the requirements for air operations in coastal defense and similar operations in minor theaters.

The *aviation* assigned to an *oversea department* conducts whatever air operations may be required incident to the application of the defense plans of the particular oversea department. It may be reinforced by GHQ aviation which then operates under the control of the department commander until returned to GHQ control.

Aviation Component of Large Units. The *aviation* organically assigned to *large units* is generally limited to reconnaissance, observation, and liaison types, suitable in range and speed to the missions to be executed. The organization of these Air Corps units is determined on the basis of the estimated minimum requirements in aviation of the several large units. When greater strength in aviation is required for any particular operation, the increase is provided by attaching additional units. A portion of GHQ aviation may be attached to or placed in support of larger units, the size and composition of such support forces depending upon the task or mission to be executed.

The *aviation* assigned to the *zone of the interior* comprises training and special purpose aviation and such other Air Corps units and establishments as are required for effective mobilization and training, and for replacement and maintenance of aviation in the theater of operations. A portion of GHQ aviation (defense forces, see par. 65) may be assigned for antiaircraft defense in the zone of the interior.

Battle Employment. The organization for combat of the aviation of a command is a function of the commander; each chief of aviation (air officer in the division) acts as adviser to his commander in the performance of this duty. This organization for combat is based on the consideration of the characteristics and the amount of aviation available, and a study of the air operations to be conducted in accordance with the situation. The organization should be such as to constitute a suitable task force to

accomplish the mission, and render command, tactical control, communication, and supply most effective.

The selection of objectives against which air operations are to be directed is of vital importance. Air operations must be pushed with energy and dispatch, using every opportunity to take full advantage of surprise. Since the replacement of flying personnel and equipment is both slow and expensive, economy of force is especially important (see par. 62). Combat aviation should be employed in mass against objectives of decisive importance for the accomplishment of the mission of the field forces, and not dispersed or dissipated in operations of minor or secondary importance.

Air operations beyond the sphere of action of the ground forces are undertaken in furtherance of the strategical plan of the commander of the field forces. These operations are discussed in FM 100-15.

Combat aviation placed in support of large units operates to further the mission of the supported command. The superior commander under whom such support aviation is operating is responsible for the assignment of air missions or objectives, and for its employment within or beyond the sphere of action of ground forces.

In general, the greatest effectiveness of military aviation is secured through centralized control. When decentralization of support aviation becomes necessary in situations requiring immediate tactical support of specified units, the superior commander attaches to or places a part or all of his support aviation in support of a specified large unit so that it may act with greater promptness and better understanding in meeting the requirements of the supported unit.

In the hands of higher commanders, *support aviation* constitutes a powerful means for influencing the course of combat after the ground forces have become engaged. The increased application of motorization and mechanization extends the possibilities for air attack. The difficulty of gaining fire superiority over a well-organized defense points to an increasing need of air attack in support of ground troops, especially in critical situations when the available means of support on the ground are inadequate.

The hostile rear area is the normal zone of action of support aviation since operations in this area permit the full utilization of striking power against concentrated targets with the minimum losses and the maximum results. Ordinarily the most effective results will be obtained from bombing attacks launched at altitudes above the effective range of ground weapons. Support aviation usually is not employed against objectives which can be effectively engaged by available ground weapons within the time required.

THE ARMORED FORCE

Evolution. The Armored Force was created during the summer and fall of 1940 by combining the light and medium tank regiments of infantry with the mechanized cavalry brigade. To these units were added command, service, and reenforcing elements. The action resulted in creating under a single commander a well-rounded, powerful striking force of mechanized units capable of independent action and of sustaining itself during the execution of its missions.

During the World War the United States formed the Tank Corps, which was the origin of mechanization in our Army. It is interesting to discover that many officers in the Tank Corps of 1918 occupy, in 1940, high positions in the Armored Force. As a result of the reorganization of the Army in 1920, the Tank Corps was absorbed by the infantry, and this arm was given the responsibility for developing and using the tank. Under this policy the Tank School was instituted at Fort Meade, Maryland; later it was moved into new and adequate quarters at Fort Benning, Georgia, where it was incorporated into the Infantry School. Tank companies formed a part of each infantry division. Regiments of light tanks and of medium tanks were formed to operate under GHQ control. As a part of the infantry, the mission of tank units was to assist assault infantry units in the capture of strongly held objectives by preceding and neutralizing the resistance. Their role did not include independent missions. Their supporting arms and services were those of the infantry division to which they were attached.

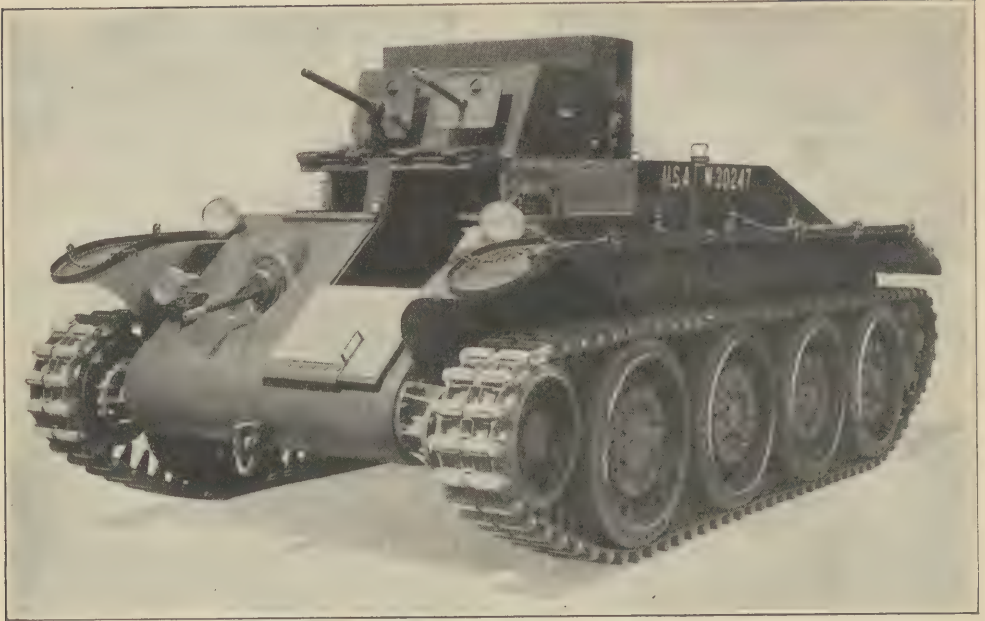


Plate 40. A Modern Tank.



Plate 41. Mechanized Cavalry Scout Car Emerging From Woods.

Mechanized cavalry, on the other hand, included several types of reconnaissance, supporting, and service vehicles as well as the tank (which was called the "combat car" in the cavalry), enabling it to operate on independent missions. It included supporting artillery. The incorporation of supporting elements and service elements permitted it to execute missions covering a wide area or to intervene rapidly at a decisive point in battle with powerful effect.

Missions of the Armored Force. The characteristics of the organization and vehicles of the Armored Force enable it to operate independently over a wide area on distant missions or to execute missions in close coordination with other ground arms and air power. *Its primary role is in offensive operations against tactical or strategical objectives deep in the hostile rear.* It can move quickly to sweep wide around a hostile large force to strike its flanks or rear, or move deeply into enemy territory to disrupt its communication facilities, lines of communication, or system of supply and control. In the execution of either type of mission it is powerfully assisted by observation aviation and air power.

The tentative organization (1940) of the Armored Force is shown in Chapter IV, ORGANIZATION OF LARGE UNITS.

Distinction between Motorized and Mechanized (Armored) Vehicles. A mechanized or armored vehicle is a fighting vehicle. It is a self-propelled motor vehicle upon which weapons are mounted. The tank and scout car are examples. The crews perform their battle missions from within the vehicle. In contrast, a motorized unit has motor transportation for movement to reach the area of combat. The fighting is done on foot. The vehicles may actually be released, in some instances, upon entry into combat to perform other missions. Some infantry and artillery units, such as the antitank company, heavy weapons company, and artillery battery, retain their trucks for movement of guns during the progress of the action. Such vehicles have no armor protection. The armored force contains both mechanized (armored) vehicles and motor vehicles.

The Tank. The tank is an armored, mobile gun platform upon which weapons are mounted; it is a self-propelled, track-laying vehicle with the important military characteristics of mobility, fire power, armor protection for the crew, and shock action or crushing power. It is the principal fighting vehicle of armored units. It can crush through some types of barbed wire entanglements, clearing the way for foot troops. It is invulnerable to small-arms fire.

Despite the power of tanks, they have their limitations. Deep streams, deep and wide trenches, thick woods of large trees, stumped areas, large hidden rocks, rivers and swamps are difficult barriers to tank movement. Artificial obstacles can be constructed which interrupt the movement of tanks. They can be engaged by the fire of antitank weapons, by artillery, and by bombs dropped from aircraft. While the tank has its limitations, as all other devices of warfare, it is an essential weapon in modern warfare with an ever-widening application in battle. (See Plate 40.)

The light tank, M2, weighs approximately ten tons. It has a cross-country speed of about 20 mph and a maximum speed on roads of about 45 mph. Its armament consists of two caliber .30 machine guns.

The medium tank, T4, weighs 13.5 tons. It has approximately the same movement characteristics as the light tank. It has greater cross-country and trench-crossing ability. It can be provided with heavier offensive weapons such as small cannon.

New models of light and medium tanks provide for increased weight and fire power.

The Scout Car. The scout car is an armored, wheeled vehicle without overhead protection carrying a crew strongly armed with automatic weapons. Its cross-country mobility and armor protection are materially less than the tank, but it has greater road speed. Its principal mission is reconnaissance, and the infantry division of the triangular type contains one troop of three platoons for this purpose. Scout cars may be used in screening and delaying operations. (See Plate 41.)

CAMOUFLAGE

Introduction. The art of camouflage is a modern essential for all arms and services. Medical units must be adept in certain phases of this subject in their own protection, for the safety of patients in their care, and to avoid disclosing the positions of other components of the force. The commander of troops subject to attack by an enemy, either from the ground or air, will demand concealment of units and installations which, if discovered, may disclose his locations or intentions. Medical units must stand ready to conceal their personnel, transportation, and installations. FM 5-20, EFM, covers the subject.

Purpose and Value. Camouflage is the art of concealing the presence of our troops and their activities from enemy observation, or of deceiving the enemy as to the extent and purpose of our activity where concealment is impossible. In small units camouflage reduces casualties by denying the enemy knowledge of the exact positions occupied by troops, thereby preventing the delivery of accurate, observed fire.

Means of Observation. Two means of observation are available to the enemy, direct visual observation through the eyes of scouts and observers, and indirect recorded observation through the lens of the aerial camera. The data supplied by the aerial photograph is by far the most important source of information open to the enemy, and our own forces as well. Deceiving the expert interpreter of aerial photographs is much more difficult than deceiving a direct observer. For these reasons the best test of all camouflage is that made by friendly aviation through observation, photography, and report.

Contrast. The camera records and the eye perceives the differences in the appearance of objects due to the manner in which they reflect light. These differences are called contrast. Contrast results from certain characteristics of objects, such as form and spacing, shade and shadow, color, and texture. The whole purpose of camouflage technique is to eliminate contrast or to render meaningless such contrast as does exist.

Form and Spacing. All natural forms are irregular in shape and irregularly spaced. Man is prone to work with regular forms and he spaces them regularly, unless a conscious effort is made to maintain the confusion of nature. Successful camouflage requires that all regularity of form and spacing be avoided.

Shades and Shadows. Shades and shadows are one of the principal sources of contrast, particularly on photographs, and are the means through which form is usually revealed. Shadows should be reduced as much as possible by keeping all works low and by breaking up regular shadows so that they will blend with those naturally present.

Color. Color is more important in direct visual observation than in photography, although similar objects of different colors do show contrast on pictures. The importance of color in camouflage is well illustrated by the protective coloration given the uniforms worn by troops.

Texture. Texture is the ability of a surface to absorb light. It is the source of a great deal of contrast on photographs. The entrance to a deep shelter will photograph black because all the light that enters the hole is absorbed and none of it emerges from the entrance again. The correct camouflage procedure is to hang a curtain over the entrance so that the spot will photograph like the adjacent trench slopes. Tall grass will photograph very dark but one man walking across it may tramp down enough grass to make a distinct path that will show on the picture. The trampled grass has a different texture and will reflect enough light to cause a distinct gray streak when photographed. Obviously, texture has nothing to do with color.

Camouflage Problems. Camouflage problems occur in almost infinite numbers and varieties. Solutions depend upon avoiding contrast. Certain elements of great importance, common to the solution of all problems, are listed below with their relative weights in attaining success in any particular problem.

Choice of position in favorable terrain, 40%.

Camouflage materials, 15%.

Skill in installation, 20%.

Camouflage discipline, 25%.

Choice of Position. Successful camouflage depends very largely on the initial choice of favorable terrain, because the other factors are themselves limited by the characteristics

of the chosen position. The particular features to be considered in selecting a position are:

Natural cover, or ease of concealment by camouflage.

Accessibility by existing roads and trails.

Defilade from direct ground and balloon observation, including flash defilade for guns.

Suitable locations for all necessary auxiliaries, such as kitchens, latrines, ammunition dumps, observation and command posts, animals, and carts. Convenience requires that these installations be near the main position, but they must be kept far enough away so that their discovery will not betray its location.

Natural Cover. Terrain that presents a great variety of contrast in the form of woods and brush, villages and houses, road and trails, gullies, streams, and fence lines is favorable for camouflage works. On the other hand, uniform ground such as pastures, grassland, cultivated fields, and flat sandy waste land, even though covered by low brush, makes concealment of works, and particularly the trails necessary for circulation, almost impossible. The options available to company officers are usually quite limited, but often a change of only a few yards will permit the location of machine guns and other weapons in broken terrain where concealment is relatively easy. Every advantage must be taken of existing opportunities to make concealment easy rather than depending upon elaborate camouflage works after elements of the defense have been located in exposed positions.

Tracks. The most obvious sign of military activity is the record of movements made on the earth's surface in the form of tracks. This record is relatively permanent and can, therefore, be photographed and studied at leisure by the enemy. For this reason important works and activities are betrayed by tracks and paths more frequently than in any other way. Tracks already in existence should be used as far as possible and movements should be confined to a minimum number of these tracks. Where a new road or path to a position is unavoidable, it should be carried on to a dummy position, another road, house, or other false destination. Circulation should be one-way to insure that no part of a road appears unused.

Camouflage Materials. Camouflage materials are of two kinds, natural and artificial.

Natural materials. In open warfare only natural materials will be available in sufficient quantities for effective work. These materials include such items as trees, brush, sod, top soil, and debris found in the locality. Their availability and use make the reproduction of the local forms, textures, and colors relatively easy if they are carefully placed and properly maintained.

Artificial materials. The most common artificial materials used in camouflage work are:

- (1) For coverings: canvas, burlap, cotton sacking, and visinet drapes.
- (2) For coloring: aniline dyes, water paints, whitewash, and mud.
- (3) For erection: poles and stakes, smooth and barbed wire, chicken wire, fishnets, and nails.

Skill in Installation. Flat-tops. The most important application of both natural and artificial camouflage materials is in the installation of what is known as a *flat-top*. A flat-top consists of wire netting or fishnets, garnished with burlap or natural materials of suitable color and texture, and supported in position parallel to the ground surface by smooth wire stretched over poles and anchored by stakes. It is used where the establishment to be concealed is low and the flat-top can be made to blend into the background. The emplacement or other object to be camouflaged is covered by the flat-top and the flat-top is garnished so that it presents no contrast with its surroundings and simply disappears. The skill necessary to make the flat-top appear natural can be acquired only by long study and constant practice.

Camouflage Discipline. Camouflage discipline is habitual obedience to the rules of individual and collective conduct necessary for the concealment of activities and establishments from enemy observation. Every soldier should learn to act at all times as if he knew himself to be under observation by the enemy. It is of little use to screen an important position if the men come out from under the screen and stand in groups to watch hostile aircraft passing overhead. The conduct of personnel should be uniform and con-

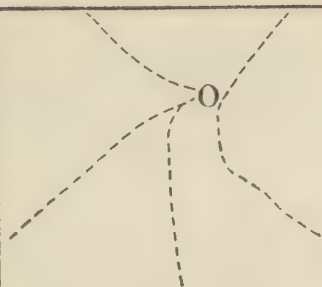


Fig. 1 TELL-TALE TRACKS

They indicate something of importance at O, although the object itself is not visible.

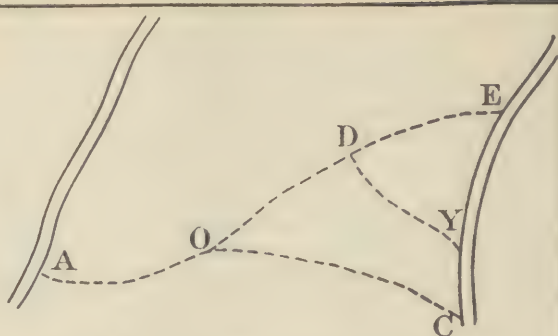


Fig. 2 CONTINUOUS TRACKS

If the tracks are carried past the locality to which they really lead (O) they do not betray its importance. But a junction is suspicious, hence O-C should be suppressed and a dummy path D-Y, put in.

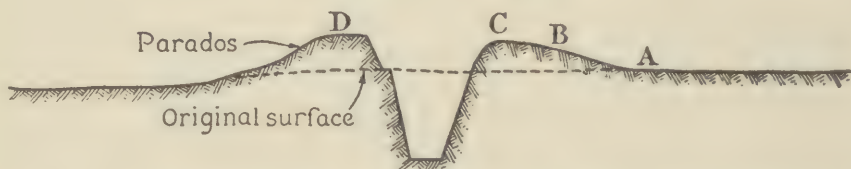
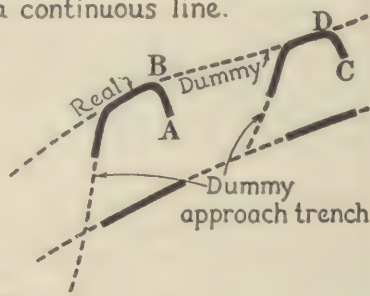


Fig. 3 CONCEALING A TRENCH FROM GROUND OBSERVATION
A-B-C-D should appear as a continuous line.



Fig. 4 CONCEALMENT AND COVER
ARE AFFORDED BY A PARAPET
WITH AN IRREGULAR CREST



**Fig. 5 CONCEALMENT OF
COMBAT GROUPS BY
DUMMY TRENCHES**
The arms A-B and C-D are
concealed by nets.



**Fig. 6 OBSTACLE CONCEALED IN AN ARTIFICIAL
DEPRESSION**

sistent. If troops are known to be in a certain locality, their daily habits may be very closely studied by enemy observers. Any change in these daily habits indicates a change in the military situation.

Details of Camouflage Discipline. Camouflage discipline involves the continuous application of common sense rules of conduct. Some of the more important of these rules are:

Never expose yourself unnecessarily to any possible hostile ground or air observer. Men in trenches should crouch in the bottom when enemy aircraft is overhead.

Movement attracts attention. Hence, avoid all unnecessary movement.

In moving about follow the prescribed routes and do not make new tracks to important localities.

Keep off skylines; move and remain in the shadows as much as possible.

Do not stand in groups in the open, especially near important places such as machine gun emplacements, and observation and command posts.

No parking of vehicles or animals in the vicinity of any vital position.

Unusual activity of any sort is almost certain to attract attention and should be avoided or always carefully concealed.

Avoid doing anything that will cause a change in the previous appearance of the ground. Excavations, piles of supplies and materials, or refuse of any kind are plainly visible. Do not throw trash around where it can be seen. Bury it in concealed trenches.

Do not expose highly colored or shiny objects.

Smoke is very conspicuous and is sure to attract attention. Avoid fires. It is helpful to break up the column of smoke from kitchens by placing them under large trees, in buildings, or by stretching a shelter half a foot or two above the flue.

Examples. Camouflage requires close attention to minute details. Common sense is the main ingredient of success, particularly in open warfare where both time and materials are limited. The study of examples of both successful and unsuccessful camouflage is a valuable aid in attaining proficiency in the art. Failures are often most instructive. The following cases illustrate some typical faults.

A couple of truck loads of footbridge equipment were brought up at night and concealed on a stream bank in heavy underbrush and drift. The stream had recently been in flood, and the underbrush was mud-covered and brown. But the footbridge equipment was covered with green pine boughs, and the mound of green in a field of brown was the most conspicuous object for miles. The camouflage material selected was wrong in color. Scattering the bridge sections around in small irregular piles, and covering them with mud and debris to make them look like drift probably would have been effective and have required less work.

Squad trenches were dug in very broken, washed, sandy clay. Before they were covered with underbrush, the parapets were beaten with the flat of a spade to insure "a neat, soldierly job." The smooth glittering surfaces were apparent in places through the covering of brush because they were the only unweathered surfaces in sight. In this case the texture was wrong.

A battalion train was halted in a clearing. The wagons were carefully backed into the woods, the animals tied up among the trees, and pine saplings leaned against the wagon covers; then—the harness was carefully piled on the wagon poles, extending into the clearing, where it looked exactly like harness piled on wagon poles at intervals around an otherwise empty clearing. Thus, carelessness in details spoiled an otherwise good job.

A reserve company marched to a large clearing in the woods, stacked arms in the open, and then concealed itself in the edge of the woods, leaving the arms' stacks shining in the sun.

SCOUTING AND PATROLLING

Scope. Scouting and patrolling deals with the duties of individual scouts and small dismounted patrols which operate on missions of reconnaissance, or security, or both. Raiding parties sent into hostile positions by surprise action to capture prisoners or for other purposes operate in a similar manner. Detachments performing these mis-

sions must be able to operate by day or night over varied ground and frequently close to or within the enemy position. This duty requires a high degree of training in concealment, movement, and observation.

Importance to Medical Personnel. The duties performed by scouts and patrols are hazardous and casualties are probable. Many of these parties are required to be accompanied by medical personnel.¹ Aid men of companies, litter bearers, and contact agents with medical detachments serving infantry regiments will be drawn upon for these assignments. The same personnel will require much the same training incident to searching a battle field for wounded and evacuating wounded, when under hostile observation or fire.

Suggested Instruction for Medical Personnel. Selected personnel of medical detachments with infantry, it is suggested, should be trained in the following subjects included in Scouting and Patrolling.

Missions of scouts, patrols, and raiding parties.

Equipment.

Formations by day and night.

Routes followed by day and night.

Concealment by day and night.

Movement by day and night.

Control signals.

FM 7-5, *Infantry Field Manual*, and FM 21-45, *Scouting and Patrolling*, are source references. The training goal might well be to provide sufficient training to enable medical personnel to accompany such detachments with safety to themselves, the casualties for whom they may be obliged to provide care, and to avoid acts which would interfere with the accomplishment of the mission of the detachment. As in other operations, accompanying medical personnel must be able to function as a part of the tactical structure, using methods which are in consonance with the force as a whole.

Missions of Scouts, Patrols, and Raiding Parties. A *scout* is a soldier whose duty is to reconnoiter or to gain information of the whereabouts, movements, and condition of the enemy.

A *patrol* is a detachment of troops sent out from a larger body on a mission of reconnaissance or security, or both. Patrols are classified in accordance with the mission upon which sent, such as reconnaissance patrols, visiting patrols, combat patrols, flanking patrols, or connecting patrols.

Raids upon hostile units are conducted (by raiding parties which operate as patrols) to capture prisoners for identification of enemy units and for other purposes.

Equipment. The arms, equipment, and clothing of patrol members will vary with the seasons, light, weather, geographical location, mission, and character of operation. The usual items of equipment of a patrol operating in daytime are rifle or pistol, haversack with rations, canteen, map, compass, watch, pencil and paper, field message book, field glass, and a cloth cover for the helmet. White uniforms, snowshoes, and skis may be used in snow. At night the helmet and bayonet may be discarded. The following articles may be added: riot gun, trench knife, clubs, blackjack, brass knuckles, sweater, knitted cap. Articles which rattle or glisten in light must be avoided. The mission and probable action of a patrol will determine its equipment.

Formations. The formations used must facilitate control by the leader and provide concealment and safety. They must facilitate immediate action to the front or flanks. They will be altered constantly to meet the changing terrain and visibility. All formations should provide a point, flank protection, and a rear point. The leader goes wherever his presence is necessary, but a position near the center is used most frequently. A patrol of six or eight men might be deployed during daylight, for example, 100 or more yards in depth and 50 or more yards in width. At night, distances are greatly reduced.

Routes, Concealment, and Movement of Patrols. The route to be followed by a

¹ The exploit of the 1st Battalion, 26th Infantry, commanded by Major Theodore Roosevelt, Jr., on June 29, 1918, is particularly informative. It is discussed on page 43, *Infantry in Battle*, United States Infantry Association.

patrol will be carefully planned in advance, by map study if necessary. The time and place of leaving and reentering the friendly lines will be arranged.

During daylight, concealment from hostile observation is necessary. Visible movement discloses the presence of men instantly. Hence, patrols take the fullest advantage of natural cover, detouring around exposed areas. Before entering a new area, the patrol will halt and study it carefully before venturing forward. Silence is important, but concealment from observation during daylight is vital. Training is conducted to enable men to select routes by which they may move without being seen, and in the study of areas to detect the presence of an enemy as well as to select the route to be followed.

During darkness, movement without noise is the vital factor. Routes in open spaces free from underbrush, leaves, and twigs or fallen branches are preferred. Even at night, however, movement across a skyline is visible for considerable distances. Training is conducted to enable men to move without being detected under the cover of darkness.

Control and Signals. During daylight, visual signals are used by the leader to the maximum extent. Simple, visual signals are used for the following (See *Infantry Drill Regulations*, Chapter 11): *Forward*, *By the right (left) flank*; *To the rear*; *Halt*; *Lie down* (or *Take cover*); *Double time* (or *Rush*); *Change direction*; *Assemble*; *As skirmishers*; *Are you ready (I am ready)*; *Enemy in sight*.

At night, hand signals cannot be seen, and talking or whispering betrays the patrol to the enemy. Control signals should be familiar night sounds and as little like human sounds as possible. The following are suitable examples: the scraping together of two sticks or stones, the rustling of a piece of paper, imitation of birds, animals, or insects. Whatever its nature, the signal should be only loud enough for all members of the patrol to hear. By such signals it must be possible to stop and move forward or check to see that all members are present.

CHAPTER IV

ORGANIZATION OF LARGE UNITS

Introduction. This chapter contains selected data on the organization of large military units. In those instances where the War Department tables of organization have not been issued, as in the case of the field army, the tables shown are drawn from those in use for purposes of instruction at the general service schools or other sources. Information on the organization of subordinate units of the arms is included in Chapter III. A detailed discussion of the organization of medical units appears in Part III of this volume.

The organization of all military units is subject to progressive change. The reasons for these changes should be understood. Armies of all nations seek to adapt to military uses the discoveries and new developments which become available. This became particularly important during the winter of 1940-41 as great nations engaged their total resources in a life and death struggle. The improvement in motor transportation has had a profound effect upon all military operations, including tactics and organization. Late years have witnessed a tremendous development in automatic arms. Methods of communication and control have been subjected to rapid improvement. All of these things, with others, have resulted in studies to determine better groupings of military units. Constant efforts are made to enable a unit to deliver a greater power, to be more mobile, and to accomplish equal tactical results with a reduced personnel. Many exhaustive experiments have been conducted to determine how these newly discovered powers should be used and what organization of units is necessary to exploit them to the fullest. As a natural result, improvement in organization has been accomplished. Study and experiment will continue. New lessons will be learned. As time passes still further changes in the details of organization are to be expected.

THE FIELD FORCES

Components. The *field forces* consist of a general headquarters (GHQ), one or more armies, the GHQ aviation, and a GHQ reserve. Several armies together with certain GHQ troops and aviation may be designated as a *group of armies* to function as a unit under a single commander.

The *GHQ reserve* is composed of troops of the various arms and services not habitually required by an army in the field. They may be allotted as reinforcing troops or used on separate missions under GHQ.

The *GHQ aviation* includes all aviation not otherwise specifically assigned and constitutes a pool of combat and transport aviation which provides forces for the conduct of offensive and defensive operations along functional lines. Neither the field army nor the army corps contain organic combat aviation; such aviation is placed under GHQ control.

The term *large units* refers to the division and larger organizations.

FIELD ARMY ORGANIZATION

Components. The *field army* consists of a headquarters, certain organic army troops, and a variable number of divisions. These divisions, together with certain auxiliary units called corps troops, are organized into *army corps*, each with a corps headquarters. Troops of the GHQ reserve and support aviation may be attached to an army as needed.

Tables of Organization for the *field army* have not as yet been issued in detail by the War Department. Plate 1 shows the *army troops* of a "type" field army of three army corps.



Plate 1. Army Troops, Type Army of Three Army Corps.

ARMY CORPS ORGANIZATION

Components. The *army corps* consists of a corps headquarters, certain organic corps troops, and a variable number of divisions. It is able to provide certain reinforcing units to the divisions of the corps from corps troops as well as from units which may have been allotted to the corps from the field army or from GHQ reserve.

Plate 2 shows a "type" army corps containing corps headquarters, corps troops, and three divisions.

The army corps is primarily a tactical unit. While functioning as part of a field army it is not a link in the system of supply or evacuation. The medical battalion of corps troops, for example, is provided to serve the corps troops and not the divisions which are a part of the corps. Army troops, on the other hand, contain strong components from the services. In practice, supplies are forwarded from installations of the field army directly to divisions, and evacuation of division as well as army corps clearing stations is a function of the medical component of army troops. These functions are responsibilities of the commanding general of the field army.

On missions which require the army corps to operate independently, it is often strongly reinforced with service elements which may be provided from army troops and attached to the corps. Under this condition, supply and evacuation become responsibilities of the commanding general of the army corps.

Army corps are designated by number, as "I Corps," "II Corps," etc.

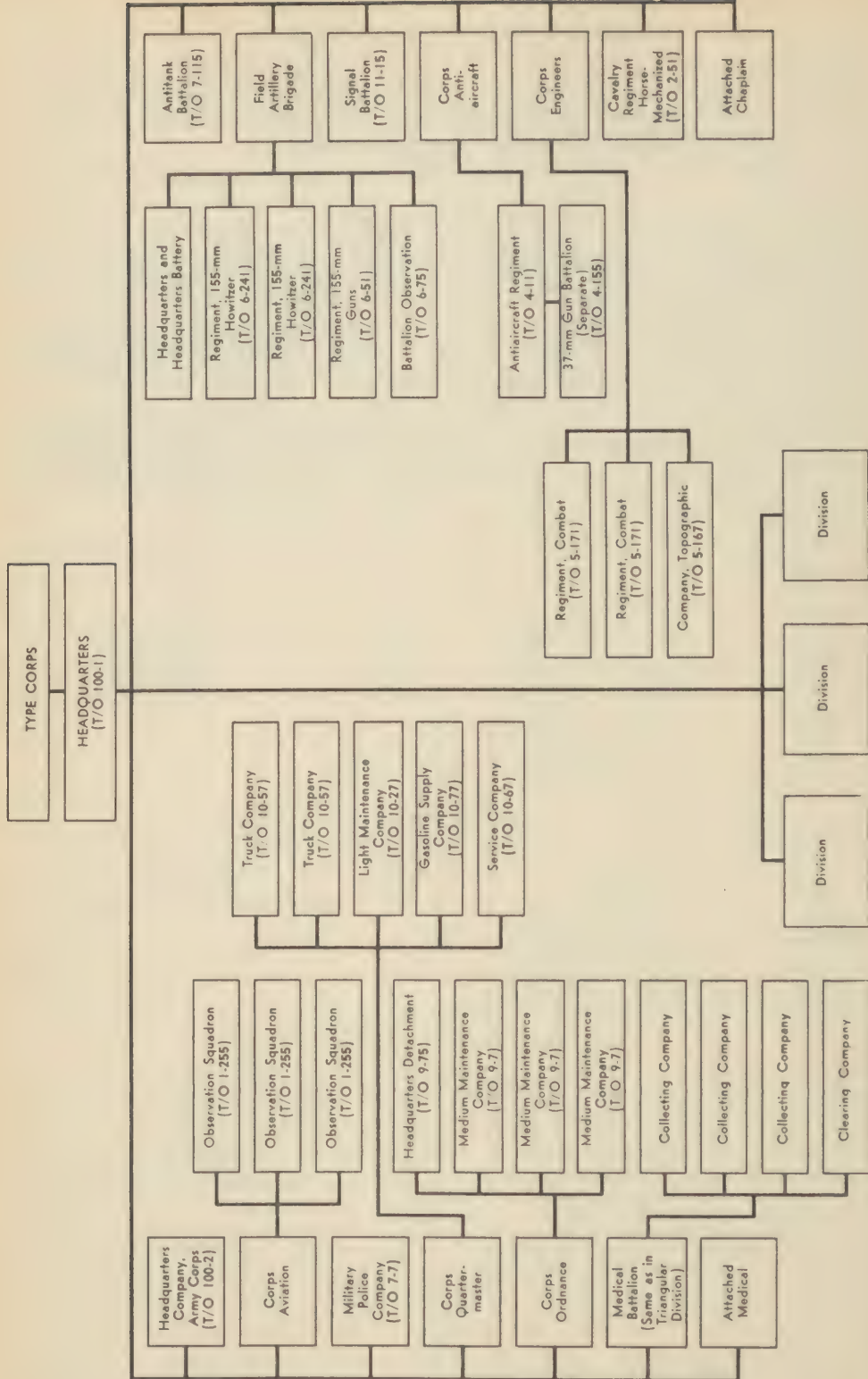


Plate 2. Type Army Corps Organization.

DIVISION ORGANIZATION, GENERAL

Definition. The division is the basic large unit of the combined arms. It comprises a headquarters and troops of the essential arms and services, all in correct proportion and so organized as to make it tactically and administratively a self-contained force capable, to a limited extent, of independent action.

A division takes its name from its principal combat element, i. e., infantry division, cavalry division, armored division. For the reason that a far greater number of infantry divisions are organized than other types, the word "infantry" is omitted from its official designation. Thus, the 1st Division is an infantry division. Other types retain the name of the principal combat element, as 1st Cavalry Division, 1st Armored Division.

The following kinds of divisional organization are discussed herein:

- Infantry Division, Square.
- Infantry Division, Triangular.
- Cavalry Division.
- Armored Division.

Components. Whatever may be the strength or form of organization of the division, it contains a *command element*, *combat elements*, and *service elements*.

The *command element* includes the commander and his staff. Commanders of divisions and larger organizations are provided with a general staff, a special staff, and a personal staff. The staff is an aid to command, serving to release the commander from much of the detail incident to the exercise of his office so that he may exert a personal influence on the outcome of battle by observing the progress, maintaining personal contact with subordinate commanders and units, and supervising the execution of his orders.

The *combat elements* participate in the fighting. They include infantry or cavalry, armored units, field artillery, combat engineers, and signal corps troops.

The *service elements* include units which are required to maintain supply and provide for the evacuation of casualties of men and animals. They include medical, quartermaster, and ordnance units.

INFANTRY DIVISION

The Army of the United States has two types of divisional organization: the "square" type, so named because it contains four infantry regiments organized into

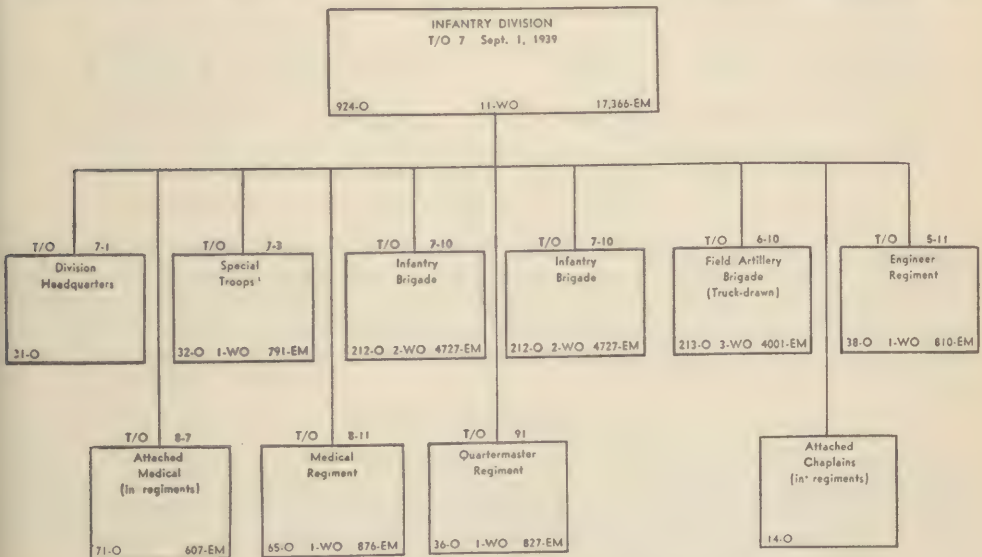


Plate 3. Infantry Division (Square Type).

¹ The division Special Troops include the Headquarters, Headquarters Company, Military Police Company, Ordnance Company, Signal Company, attached Medical personnel, attached Chaplain.

two brigades of two regiments each, and the "triangular" type which contains but three infantry regiments without a brigade echelon. Divisions of the National Guard and of the Organized Reserve units are formed in the square type of organization. The Regular Army divisions organized within the continental United States are all of the triangular form.

The terms "war strength" and "peace strength" are disappearing from use since the latter is considered to be dependent upon annual appropriations rather than a specific "strength" adequate to a particular condition of peace.

Plate 3 shows the organization of an infantry division, "Square" type.

INFANTRY DIVISION "TRIANGULAR"

General. Plate 4 shows the organization adopted during the fall of 1940 for the Regular Army. It is designated as a "triangular" division because it includes but three infantry regiments, whereas its predecessor as still used by the National Guard and Organized Reserve units has four. The brigade echelon disappears in this organization.

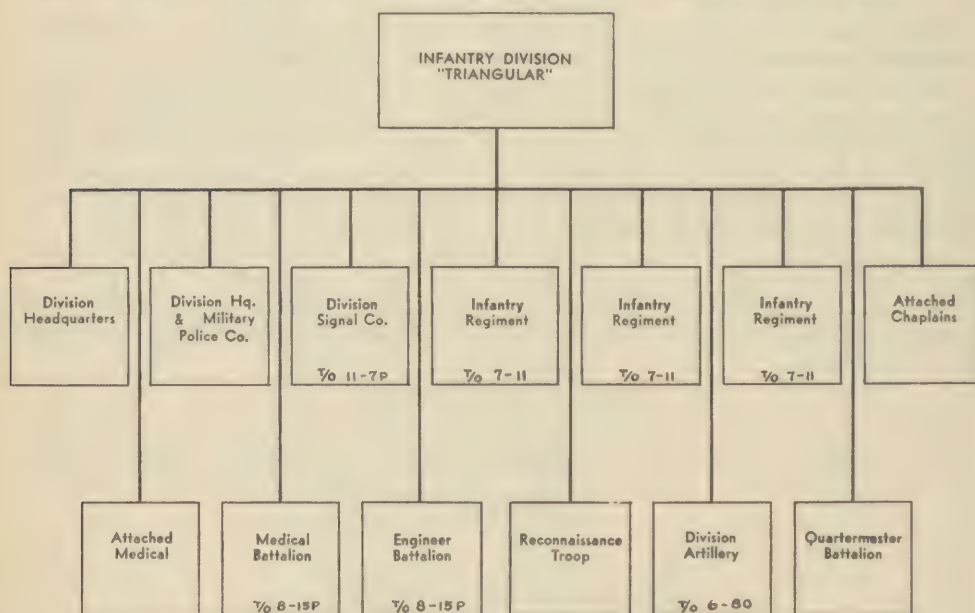


Plate 4. Infantry Division (Triangular Type).

CAVALRY DIVISION

General. The cavalry division is shown in Plate 5. Cavalry divisions are capable of independent action to a limited extent in the same manner as infantry divisions. They may be formed into cavalry corps of two or more cavalry divisions and certain corps troops. Units of the cavalry arm may be attached to the infantry division or corps as reinforcing troops when their presence is desirable in the conduct of operations in the field.

THE ARMORED FORCE

The Armored Force was formed in 1940 by combining the tank regiments of infantry with the mechanized brigade of cavalry and adding other supporting and service units. Its initial organization provided an armored corps consisting of a corps headquarters, corps headquarters company, and two armored divisions. Chapter III, TACTICAL FUNCTIONS OF THE ARMS, contains information about the vehicles, missions, and characteristics of armored forces.

Plates 6 and 7 show the organization of the armored corps, armored division, and brigade as adopted initially.

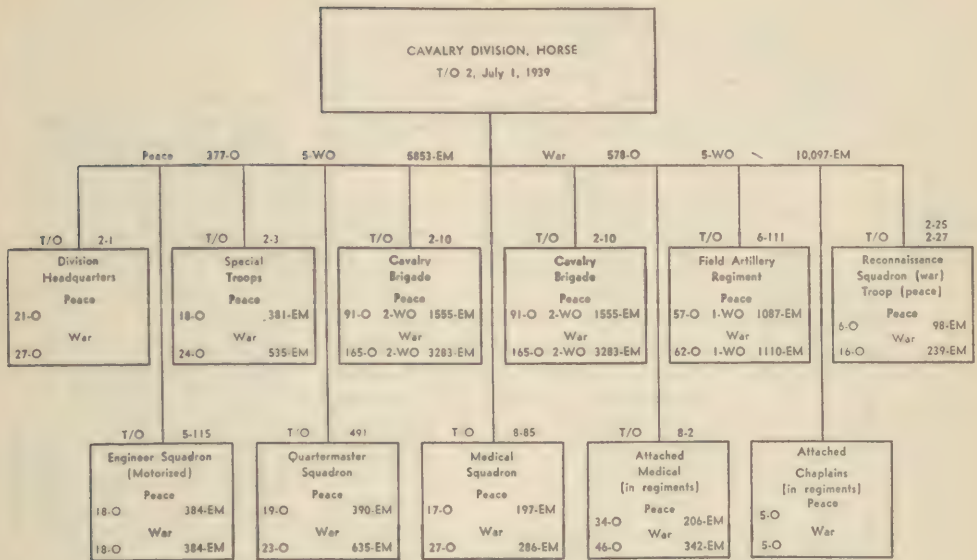


Plate 5. Cavalry Division, Horse, T/O July 1, 1939.

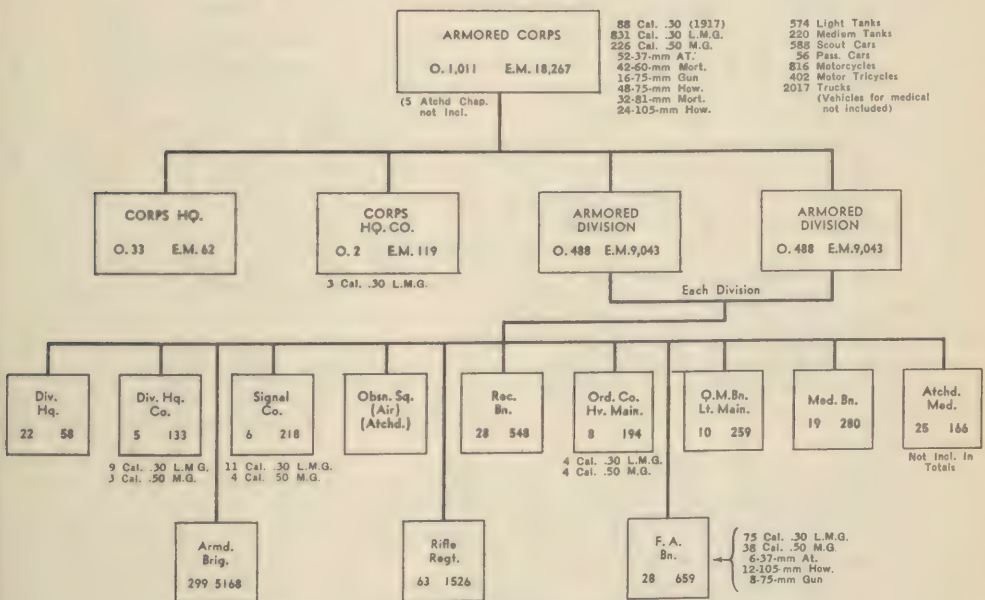


Plate 6. The Armored Corps (Tentative).

REINFORCING UNITS

Source and Purpose of Reinforcing Units. The organic units of a military force are prescribed by tables of organization issued by the War Department. In all cases the supporting units, such as field artillery, and service units, such as medical and quartermaster organizations, are provided in a strength sufficient only for normal operations and tactical missions, if there is in fact such a thing as a "normal" operation in campaign. They are not burdened with units for which there is not a continuous need. It is a principle of command that the assignment of a mission should be accompanied by the allotment of means sufficient for its accomplishment. This condition requires the allotment, from time to time, of reinforcing units.

The necessity for allotting reinforcing units is more general for divisions or army corps which are operating on independent missions. In such a case the reinforcing units are attached temporarily to a subordinate command at which time they function as directed by the commander of the unit to which attached in the same manner as his organic units. A division operating as part of a corps may also have reinforcing units attached in the same manner, but in many instances it may be provided with additional aid by units which continue to operate under corps control. For example, observation aviation attached to a division would receive orders from the division commander; if not attached, it might execute the same missions upon request of the division submitted to the corps commander who would direct that the mission be executed. This permits the same unit of observation aviation to execute missions for several units of the corps, each executed under corps control.

Reinforcing units are furnished from organizations available to the next higher commander for employment or allotment. A division commander might reinforce an infantry brigade which is sent on an independent mission with field artillery, engineers, medical units, quartermaster units, and other organizations to meet their requirements. Similarly, a corps commander might reinforce one or more of his divisions from his corps troops. In many instances reinforcing units will be furnished from GHQ reserve. In all cases units attached revert to their former status for control when released from attachment.

As a further aid to visualizing the need for reinforcing units, consider the problem of an infantry division making a river crossing in the face of anticipated strong resistance. It has the immediate need for engineer ponton companies to cross the initial combat teams by means of assault boats, and for the construction of ponton bridges on which to move the heavy weapons and equipment. There will be a need for construction of approaches to the river to reach the ponton bridge for which still more engineer troops will be required. The enemy may seek to destroy the ponton bridge by use of aviation, and this forces the employment of antiaircraft artillery. Chemical units may be necessary for laying smoke to screen the crossing in order to reduce the effect of hostile aimed fire. Strong artillery support to protect the units making the initial crossing may be necessary, and additional field artillery units may be provided. Distant reconnaissance beyond the scope of ground agencies may be desirable to locate the positions of hostile reserves and their movement to block the crossing; observation aviation may be provided for this mission. The need for tank units may be foreseen as soon as they can be crossed on the ponton bridge; if this is the case they may be furnished from GHQ reserve. The principle should be appreciated that means must be furnished in accordance with the requirements of the assigned mission.

For purposes of convenience, problems given in the Army Correspondence Courses and at the general and special service schools often make use of such terms as "The 1st Division, Reinforced" without specifying the nature and extent of the reinforcements. In such a case the units included are stated within the problem or listed in special tables of organization which are quoted. It is important that the attached units be definitely ascertained and their use provided for in the contemplated action in the same manner as the organic units.

CHAPTER V

TACTICAL EMPLOYMENT OF THE COMBINED ARMS

*It ain't the guns or armament, or
the money they can pay,
It's the close cooperation that makes
them win the day;
It ain't the individual, nor the army as a
whole,
But the everlastin' teamwork of
every bloomin' soul.*

—J. MASON KNOX in *Coöperation*

INTRODUCTION

This chapter presents several phases of the tactical employment of the combined arms. Large scale military operations consist of the joint action of each of the arms and services, organized into divisions, corps, and field armies, in the accomplishment of a single assigned mission, or objective, in accordance with the will of the commander as expressed in orders. At the outset it must be realized that unity of effort is essential to success. This means that each of the separate arms and services, and each unit in which they are organized for functional purposes, must operate in such a manner that each accomplishes its assigned task, and coordinates its action with others to the end that the action of the whole is directed towards a common goal. No one arm or service operates alone or wins battles alone. It is well to remember that. Each contributes something that is vital, something that cannot be omitted, to the action of the whole force.

The military student should start with a study of the mission, equipment, organization, and tactical employment in battle of each of the several components. He may then proceed to an analysis of the action of large military forces of the combined arms, in all of the wide pattern of battle conditions. When this study is reinforced with actual experience or observation, even in maneuvers, and in the study of historical illustrations, his understanding of the infinite variety of battle conditions is expanded. If he will then obtain a thorough understanding of the tactics and technique of his own arm or service, and a proven ability to execute its numerous arts, he is better equipped to function as a member of a tactical team. That is the goal. It is not easy of accomplishment. Even the best officer can be expert in but a very few phases of the tremendous scope of military operations. But a wide understanding and appreciation of many of its phases is possible of attainment.

This chapter presents an analysis in brief of the following battle phases and is presented to the military student as an approach to the study: *Marches, Security, Offensive Combat, Pursuit, Defensive Combat, Withdrawal from Action, Delaying Action, Retirement, Antiaircraft Defense, Antimechanized Defense, and Standing Operating Procedures.*

MARCHES

Importance. The ability of a command to concentrate superior forces where required depends in large measure upon the march capacity of the troops.

Ability to march long distances, in good order, and arrive in condition fit to fight has long been recognized as a unit of measure of the combat worth of an organization. Motorization has eased the difficulty of marching, in some particulars, but has not reduced its importance. Some men may "march" in motor vehicles, rather than afoot. Individual equipment heretofore carried on the backs of men, may be transported in trucks. The use of combat vehicles as a means of transport is a material aid. But the art of conducting marches includes movements by motor transport, and the need for careful planning is in no way reduced. Nor is motor transportation available in such quantities as to free any considerable portion of combat units from the recurring necessity of marching.

It is hard to endure long marches. In campaign, marches must be conducted with little

regard to weather. When men march through mud or snow, at night, in rain, or in the sweltering heat of summer through the dust-laden air of dirt roads, serious strains are imposed upon their endurance. With all the hardships, except for physical incapacity to continue, men cannot be allowed to break ranks. The march must continue.

The planning of a march requires skill and foresight on the part of commanders and staffs. When a command marches in several columns, by different routes, and at varying rates, coordination is required, or confusion and delay will be inevitable. Training of the staff in planning the march is an important factor in the marching ability of large units.

Purpose of Marches. The purpose of marches is to place the troops at the *desired place*, at the *desired time*, in *proper condition* for the contemplated duty.

In the execution of marches to attain these purposes, the following principles must be observed:

(1) To facilitate any maneuver that may be necessary or desirable. This includes an analysis of the enemy's capabilities.

(2) To assure speed of movement and rapidity of deployment. This includes judicious use of means of transport, arrangements to facilitate ease of marching, and the arrangement of the components of a command in a suitable formation for prompt entry into action.

(3) To conserve as much as possible the strength of troops.

(4) To protect the troops from attack by hostile aviation and mechanized forces or surprise attack by other ground troops.

Rates and Lengths of Marches. Rates and lengths of marches are subject to variation from the effects of weather, the size of the command, the condition of roads, the weight of individual equipment for which transport cannot be provided, and the nature of the terrain. The accompanying table shows the average rates and lengths of marches under different conditions and methods of transport.

Unit	Average Rates of March (mph)				Lengths of March
	On Roads		Across Country		
	Day	Night	Day	Night	
Foot troops -----	2½	2	1½	1	12 for a division 15 for smaller units
Tanks, truck-drawn light artillery, cavalry combat cars, trucks, ambulances, motorized units --	25	25 ¹ 10 ²	8	5	150-175
Horse-drawn artillery -----	3½	3	3	2	20
Cavalry, animal elements -----	6 ³	5	5	4	35
Cars, armored or scout -----	35	35 ¹ 10 ²	10	5	200

¹ With lights. ² Without lights. ³ May exceed this rate for short distances or limited periods.

Troop Movement by Motor Transport. Few units within the infantry division are fully motorized. When it is desired to move an entire division at one time, additional vehicles must be attached for the purpose from the quartermaster truck battalions of the corps and the army. Based upon 12 men with individual equipment to each 1½-ton truck and 20 per 2½-ton vehicle, the following numbers of *additional* trucks are necessary to haul representative war-strength units:

	1½-ton	2½-ton
Infantry battalion	35	21
Infantry regiment	121	74
Infantry brigade	244	150
Infantry division	544	334

In this connection, it is noteworthy that the medical regiment at war strength moving by means of its own transport can, at the same time, carry 36 patients in the surplus space of its own ambulances.

It is practicable to move an entire infantry division by its own organic transportation.

To use this method it is necessary to divide the force into two or more subdivisions, each to be transported separately. For tactical moves each subdivision should be formed into a balanced fighting team. Cargoes of the organic vehicles are unloaded at the point of origin of the movement, or delivered at the destination, as desired. The trucks are then made available for the movement of each subdivision in turn. This process is called "shuttling." The distance which may be covered by a force in one day depends, among other factors, upon the time required for loading and unloading and the total number of trips required. It has been determined that it is reasonable to move an infantry division 75 miles in one day by this process under favorable conditions. The minimum distance at which it is faster to move by the shuttling process than by marching is considered to be 12 miles for a large force.

Each subdivision must provide its own security measures while en route, including adequate measures against attack by air or mechanized units.

Definitions of Common March Terms. *Daylight march.* A march which begins and ends in daylight. Except in oppressive heat they are easier on the troops than night marches. The hazard of attack from the air or by mechanized forces may require special precautions.

Night march. A march which begins and ends in darkness.

Forced march. A march in which the distance covered in a single stage is greater than normal, or in which the distance covered in several stages is accomplished in a time less than that which would be employed in marching by normal stages with normal long halts. A march by foot troops longer than 15 miles in a single stage is a forced march. Forced marches seriously impair the fighting efficiency of even the best troops. They are undertaken only in cases of urgent necessity. Troops should be informed why the march is necessary.

Cross-country march. The tactical situation may require a marching column to leave the road and move across-country at a reduced rate. If made at night such marches are most fatiguing as well as difficult to control.

Non-tactical march. A march conducted when contact with an enemy is impossible. The comfort and convenience of troops becomes the dominant consideration. Ease of marching is enhanced by forming march serials of units having the same march rate.

Tactical march. A march conducted when contact with hostile ground forces is possible. Under these conditions columns are constituted in such a manner as to be quickly developed for battle.

Marches for training and concentration purposes. Marches conducted in the course of training are for the purpose of instilling knowledge in how to prepare for the march, for enforcing march discipline, and for hardening the men. Since they are usually conducted in time of peace, or if in time of war at places remote from interference by the enemy, they are conducted so as to best facilitate their purposes and with every consideration being given to the comfort and convenience of the troops participating. Marches conducted by green or inexperienced troops are short. As experience is gained, and the troops become trained and hardened, the length of the daily march is gradually extended until the maximum rate and distance can be accomplished without difficulty.

Marches for concentration purposes are conducted for the purpose of gathering together the scattered elements of a large command. Depending on the situation, speed is sometimes necessary, and the daily marches may be longer than those for training purposes. Since marches for this purpose, however, are usually conducted without the probability of enemy interference, primary consideration is given to the comfort and convenience of the men.

March unit. The movement of marching troops is based upon a unit that halts and moves at the command or signal of its commander. This is called the *march unit*. In the infantry and horse-drawn artillery the march unit is the battalion; in the cavalry, the squadron.

Road space. The road space of a unit is its length from head to tail when in prescribed march formation.

Time length. The time length of a column is the time in minutes required by the entire column, moving at a given speed, to pass a given point. This is determined by dividing its road space in yards by its speed in yards per minute.

Time distance. This is the time required to move from one place to another at a given speed. It is determined by dividing the distance between the two points in yards by the rate of march in yards per minute.

Initial point. The initial point is an easily recognizable topographical feature, such as a road junction or house, at which units which are to be formed into a march column arrive at the exact minute to take their places in the column. It should be so selected that no unit is forced to march to the rear in order to reach it.

Hour of arrival. The hour of arrival is the hour at which the head of the march unit reaches the initial point.

Hour of clearance. The hour of clearance is the hour at which the tail of the unit (march unit) passes the initial point.

Order of march. In a non-tactical march units are arranged in order in the column or columns to enhance the comfort and convenience of the troops. In a tactical march a column is arranged from head to tail in the approximate order of entry into combat.

Column combat teams. When a large force marches in several columns, each column may be formed of units which will facilitate effective entry into combat. These are often referred to as column combat teams or march groups. For example, a column might be formed to include a regiment of infantry, a battalion of light artillery, a small engineer unit such as a platoon, and a medical detachment from the division medical regiment or battalion.

Stage. A march stage is a distance covered by marching which is broken by a long rest period of several hours. Normally, it is a march between bivouac areas. A march in several stages is one which is too long to be made in a continuous movement; the time en route is broken by one or more periods to allow the troops to rest and recuperate.

Coordinating point or coordinating line. Control of a large command marching in several columns is often a difficult procedure. When contact with an enemy is possible it may be desirable to maintain a fixed formation, as columns abreast or echeloned to the right (left) rear. The routes of the several columns will often vary in length. This can result in disrupting the desired formation. A coordinating point, or series of points, may be designated by the commander for each column with the prescription that it be reached, passed, or cleared at a stated time. A coordinating line, such as a road crossing the several routes, is used in the same manner. By this process some units will be required to halt until others reach the coordinating point, whereupon the advance of the force is resumed in the prescribed formation.

Preparation for a March. Preliminary preparation contributes to the success of a march. The commander and staff must plan the march in all of its details, including selection of routes, time of starting the march, formation, and security measures. A warning order issued to subordinate unit commanders enables them to make orderly arrangements to facilitate the movement.

Upon receipt of information from a superior that a march is to be made at a certain hour and date, or to be ready to march with a definite short notice, the commander of a subordinate unit should begin preliminary arrangements without undue delay. These preparations may include the following:

- (1) Notify subordinate officers, and key noncommissioned officers (1st sergeant, mess sergeant, supply sergeant, stable sergeant), of his plans for the march.

- (2) Make or direct a thorough inspection of all vehicles for condition, lubrication, equipment, and loads.

- (3) Determine the exact minute for beginning the march so as to join the battalion or squadron when directed.

- (4) Make or direct a thorough inspection of the feet of the men, including the fitting of shoes and socks.

- (5) Make or direct a thorough inspection of saddles, packs, and harness for condition, cleanliness, and state of repair.
- (6) Determine the hour for serving the last meal preceding the march.
- (7) Determine the type of food to be carried on the march.
- (8) Determine the hour when tents will be struck (if necessary) and equipment loaded on vehicles.
- (9) Determine the hour when animals will be fed, watered, harnessed, or saddled.
- (10) Determine the type of equipment to be carried and the uniform to be worn.
- (11) Issue an oral or written warning order to the command embodying all of the above pertinent details.
- (12) Require canteens to be filled before starting the march.

Forming the Column. Units in camp or bivouac are usually somewhat scattered and, when consolidated for a march, must be gathered together with the least practicable loss of time and effort (see Plate 1). Companies, troops, and batteries are usually first consolidated into their respective battalions or squadrons, and these are in turn conducted by their commanders to an assembly point of the regiment. For this purpose the battalion or squadron commanders announce an initial point for their units and the time the head of

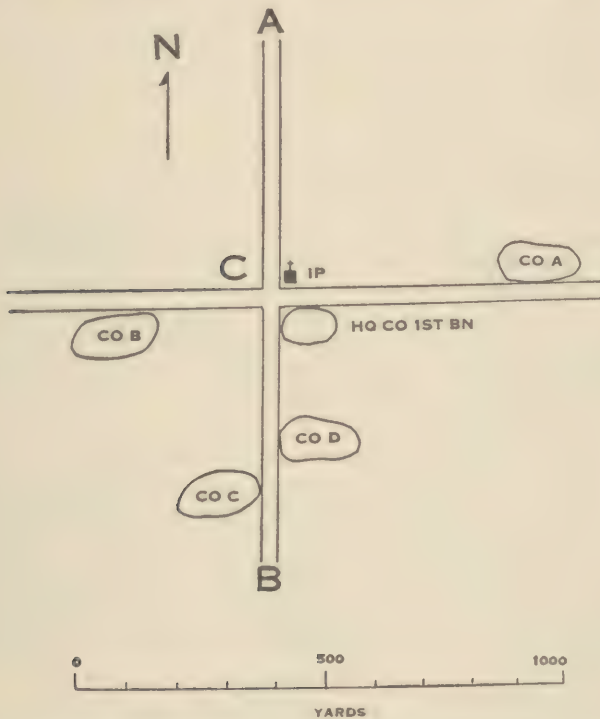


Plate 1. Battalion in Bivouac Prior to a March.

the unit will pass that point en route to the regimental rendezvous. It is the duty of each subordinate leader to so time his departure from his own bivouac, to so choose the most direct and practicable route to the battalion or squadron initial point, and to so regulate the speed of his movement as will enable his unit to arrive at the exact moment necessary to join the column without waiting, without countermarching, and without interfering with the movement of other units. To determine these factors, an exact knowledge of road spaces, time length, rates, and time distances is necessary. Marches to the rear to reach the IP are objectionable.

Route Reconnaissance. No steps must be left undone to make certain that chance of

losing the route is eliminated. The confusion, loss of time, and reduction of morale caused by countermarching to correct an error must be avoided. Whenever it is possible to do so, reconnaissance of routes should be made prior to the beginning of the march. Guides may be stationed at points of change of direction or markers placed to indicate the way. The need for guides is increased during a night march.

Protection against Air Attack. Troops in march formation are especially vulnerable to attack from the air. Night marches reduce but do not eliminate this hazard. Safety is increased by requiring more distance between units, such as 50 yards between platoons. Units provided with weapons capable of delivering antiaircraft fire should march ready for action. Other units, such as a medical regiment which has no arms, should be protected by a machine gun unit of appropriate size placed nearby. All men should be trained in the methods of antiaircraft defense so that appropriate action may be taken at once upon order or signal.

Conduct of the March. *Rotation of march units.* March units within a larger force are rotated daily; that is, the battalion or squadron which leads the regiment today will be the last element in the column tomorrow. Within each march unit companies, troops, and batteries, and within such units, platoons, are similarly rotated, except that the heavy weapons company of the infantry battalion is usually the last element in the column at all times, because of the presence of the company train. If the march is being conducted in the presence of the enemy, however, tactical conditions may prohibit this rotation. Under such conditions, the headquarters units habitually march at the head of the march unit, and elements of the heavy weapons company may be distributed through the column.

Position of officers. Officers march where they can best control the conduct of the march. At least one should march at the tail of each company, troop, or battery.

Eating and drinking. Eating during the progress of the march, except at long halts, is prohibited. Drinking, except water from canteens or containers carried in the trains, is also prohibited. Especial care should be taken that the men do not drink from roadside springs, wells, or streams. The men should be encouraged to drink copiously before the beginning of the march, should be required to start the march with full canteens, and should be cautioned to drink sparingly from canteens during the march. The trained and experienced soldier, except under excessively hot or dusty conditions, will complete the march with water remaining in his canteen. The recruit, unless prevented, will empty his canteen in the first hour.

Halts. (1) *Intervals.* A halt of 15 minutes should be made after the first 45 minutes of marching. Thereafter halts are made for 10 minutes after each 50 minutes of marching. Since small units usually march as parts of larger commands, and as these regulate the time of halts in accordance with the hour of starting of the leading unit, the first halt will usually take place in less than 45 minutes from the hour of starting of units in rear. However, each march unit halts simultaneously, at the prescribed time. Since it is desirable to complete the march as early in the day as practicable, halts longer than 15 minutes are not generally ordered, except that one such may be ordered during the hottest period of the day.

(2) *Conduct at halts.* When a halt is ordered the men fall out along the side of the road, remove and adjust their equipment, relieve themselves, and take advantage of the opportunity to rest. The adjustment of saddles, packs, and harness is examined and corrected if necessary. Good march discipline requires men to remain entirely off the road, on the right, to clear the road surface for traffic.

(3) *Resuming the march.* March units resume the march simultaneously. About one minute before the end of the rest period a warning signal is given by each company, troop, or battery commander. Dismounted men sling their equipment and take their places in ranks. Mounted men mount and take their places in ranks. The drivers and other personnel who are carried on vehicles resume their places. At the command of the march unit commander the entire unit resumes the march.

March discipline. (1) Straggling is strictly prohibited. Men are not permitted to fall out without the authority of an officer. The officer who marches at the tail of each

company, troop, or battery examines each member of the organization who desires to fall out, and either gives him a written permit to report to the medical officer at the tail of the main column or requires him to continue the march.

(2) Each unit is kept closed up to the prescribed distance from the unit in front. If proper march discipline is maintained no elongation of the column will result. If for any reason such elongation occurs, that is, should greater than the prescribed distance result, this distance is made up before the unit halts. This naturally results in curtailing the rest periods and should be avoided whenever practicable.

Duties of officers. In addition to the duties of officers specifically mentioned previously they have the following duties:

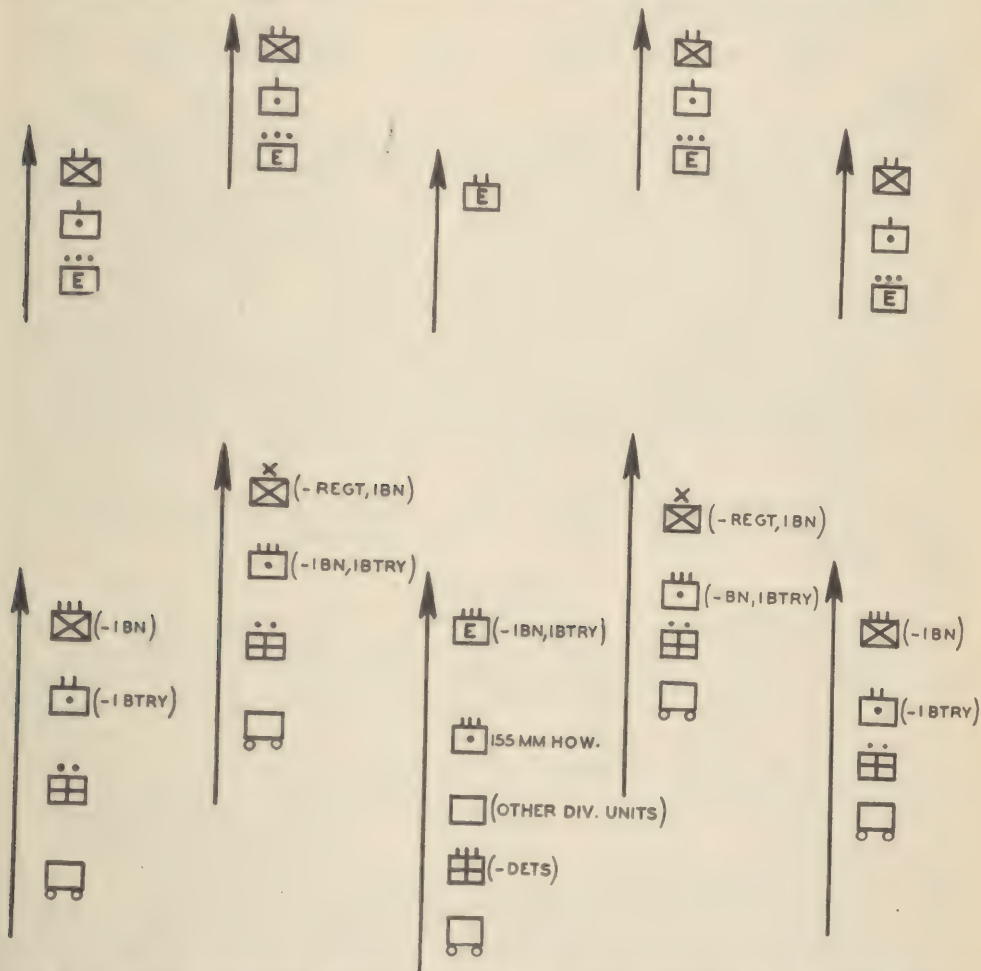


Plate 2. Infantry Division (Square) Marching in Five Columns with Advance Guards.

- (1) Enforce all march regulations mentioned in this paragraph.
- (2) Examine or cause to be examined the backs, shoulders, and hoofs of animals, if any, at intervals during the march.
- (3) Correct improper adjustment of equipment of the men.
- (4) At the end of the day's march examine the feet of dismounted men, make necessary adjustments of shoes and socks, require the men to bathe their feet, and have abrasions and blisters treated by medical personnel.

Occupation of a Bivouac from March Formation. The commander of a force in march or of its march subdivisions may facilitate the entry into bivouac or assembly areas by pre-

liminary instruction of guides. He may direct that guides from subordinate units, such as infantry battalions, proceed rapidly in advance of the column to a point in or near the point of terminating the march. After being shown the area each unit is to occupy they then return to their respective units to guide them directly into the prescribed area. This process eliminates the delay and confusion which may ensue by making these arrangements after units have arrived. Unit signs to guide organizations off roads help to prevent confusion and loss of time.

Time of Terminating Marches. *Night marches* which are executed for secrecy should be completed at least one hour prior to daylight to allow time for troops to conceal themselves against observation from the air.

Daylight marches should be completed at least one hour prior to darkness so that troops may establish themselves in the new bivouac in daylight as a means of reducing confusion.

Large Forces in March. The march of large forces such as the brigade or division may be conducted in one column or several columns. The single column is easier to control, but because of the considerable road space which is required the command cannot quickly be deployed for combat upon contact with an enemy. When such contact is possible, and several routes are available for use, forces such as the infantry brigade and larger units will often march in several columns. The formation used may employ columns moving abreast, columns echeloned to the right (left) rear, or other arrangements considered to be best adapted to the tactical situation. The commander of each column is usually made responsible for its own security to the front and often to an exposed flank. This requires each column to be preceded by an advance guard. The order of march of units in each column should be such that entry into combat is facilitated. This requires that the main body be formed with infantry units in advance and supporting artillery immediately in rear. Trains and other components of the column will be farther in rear.

Plate 2 illustrates *one way* of arranging the units of a division consisting of two infantry brigades and an artillery brigade of two light regiments and one medium regiment. It shows a division marching in five columns, each column preceded by an advance guard.

SECURITY

It is a military axiom that it is unforgivable for a commander to permit his force to be surprised. Surprise results when the onset of the enemy is so sudden that the main body of a force is unable to defend itself on the ground and under conditions of its own choice. Security measures must be taken to protect troops on the march or in bivouac against all hostile capabilities, either by attack from the air, his mechanized units, or other ground forces. Security measures constitute an essential part of all tactical operations, and orders for a march or a bivouac prescribe the measures to be observed. Security is an essential and continuous part of command responsibility.

The close-in protection of troops on the march or in bivouac falls to the infantry, which is often supported by field artillery and augmented by other arms. Troops on the march are protected by advance guards, flank guards, and rear guards as may be necessary. Troops in bivouac are protected by the outpost. The discussion of infantry in Chapter III, "Tactical Functions of the Arms," presents details of this phase of security. Plate 2 shows an infantry division in march in five columns, each column preceded by an advance guard. Plate 3 shows the reconnaissance areas surrounding a large force as an aid to security.

Extent of Security Measures. The commander must determine or estimate the hostile capabilities for interference or contact and provide protection against them. In one case he may need to consider only the possibility of air attack. In another he may limit his security measures to raids by mechanized units and air attack. The ultimate case will include protection against action by enemy ground forces as well as mechanized and air threats.

The size of the force is a controlling factor in the distances to the front, flanks, or rear to which units in the service of security will be dispatched. Large forces require a con-

siderable time to develop for combat because of the large front they occupy in battle formation and the intricacy of their supply, communication, and evacuation requirements.

The per cent of a command to which it is reasonable to assign missions in the service of security is subject to very definite limitations. The task is hard, dangerous at times, and fatiguing. The principle is that the bulk of a force is protected within an area in which it is free to move and operate with comparative safety. As a basis of comparison a maximum of one-third of the fighting strength of a force may be used on this mission. Only the number of men actually required should be employed.

General Measures for Maintaining Security. It is useful to think of the measures to provide for the security of a command as consisting of two general functions: first, reconnaissance; and second, the positive measures of attack, defense, or delaying action.

Reconnaissance is conducted to discover the presence of an enemy force so that its capabilities for interference may be estimated. Observation aviation, mechanized units, horse cavalry, and motorized units of infantry with artillery support may each be utilized independently or in conjunction with one another on this mission. In addition, the advance guard or outpost executes this task in the proximity of the main force. The goal of these security agencies, insofar as it pertains to reconnaissance, is first to discover hostile groups and then to report their presence *in time to permit the commander of the main force to take appropriate action*. A small force such as an infantry battalion may require warning of only a few minutes, if posted and alerted in a defensive position, or an hour or more if in bivouac. A large force, such as a corps, if undeveloped for combat, may require several days' warning. The commander is "surprised" by enemy action unless his freedom of maneuver is maintained and he is able to take full and complete measures of attack or defense prior to the delivery of the hostile blow. The reconnaissance measures instituted must be adequate to gain the extent of warning which is required. For the most part, all units on security missions execute reconnaissance.

The *positive measures* of providing security involve combat. If the hostile force is small, units on security missions may attack to destroy or disperse it. They may defend a key point of terrain which the enemy cannot avoid and attempt to block the hostile action. They may fight a delaying action to reduce the rate of advance of the enemy and thus gain time for the commander to take appropriate action. Delaying action may be executed effectively by relatively small mechanized units, horse cavalry, or motorized detachments of infantry with artillery support; they may not be able to block a determined enemy advance, but regardless of the enemy strength they can harass, impede, and delay him.

Action of Advance, Flank, and Rear Guards on Contact. When any security detachment which is protecting a force in march gains contact with an enemy force it takes immediate and aggressive action in accordance with its mission. The mission assigned to each of these components may vary.

Assume that the advance guard of a column makes sudden contact with an enemy force of unknown strength. The mission of an advance guard, in brief, is to *precede, protect, and clear the way* for the uninterrupted advance of the main body. The way cannot be cleared unless the hostile force is attacked at once and destroyed or driven back. Unless this result is accomplished by the prompt development of the maximum offensive power of the advance guard, the main body may be forced to halt or, if it continues to march, come under the fire of the enemy in route march formation—a highly dangerous procedure. Hence, under these conditions the advance guard must attack, else the advance of the main body will be delayed. Of course, the enemy force may be too strong for successful attack by the small force used in the advance guard. But it attacks, nevertheless, and by this action forces the enemy to disclose his strength, his position, and his intentions so that the commander of the main force may take the action he desires.

The action of flank and rear guards is somewhat different. Their mission is primarily that of protection combined with reconnaissance. If an enemy force makes contact with a flank guard, the action is essentially that of blocking so as to prevent interference with

the main body in march. Defensive action, in this case, may satisfy the requirements of the mission.

A rear guard has a mission analogous to that of flank guards in that it seeks to block an enemy from gaining contact with the rear of a force so that it need not halt its movement. Rear guards reach their greatest application in covering a retirement which the enemy may seek to convert to a rout by instituting an aggressive pursuit. Under these conditions the rear guard must block the hostile threat to the main body by executing

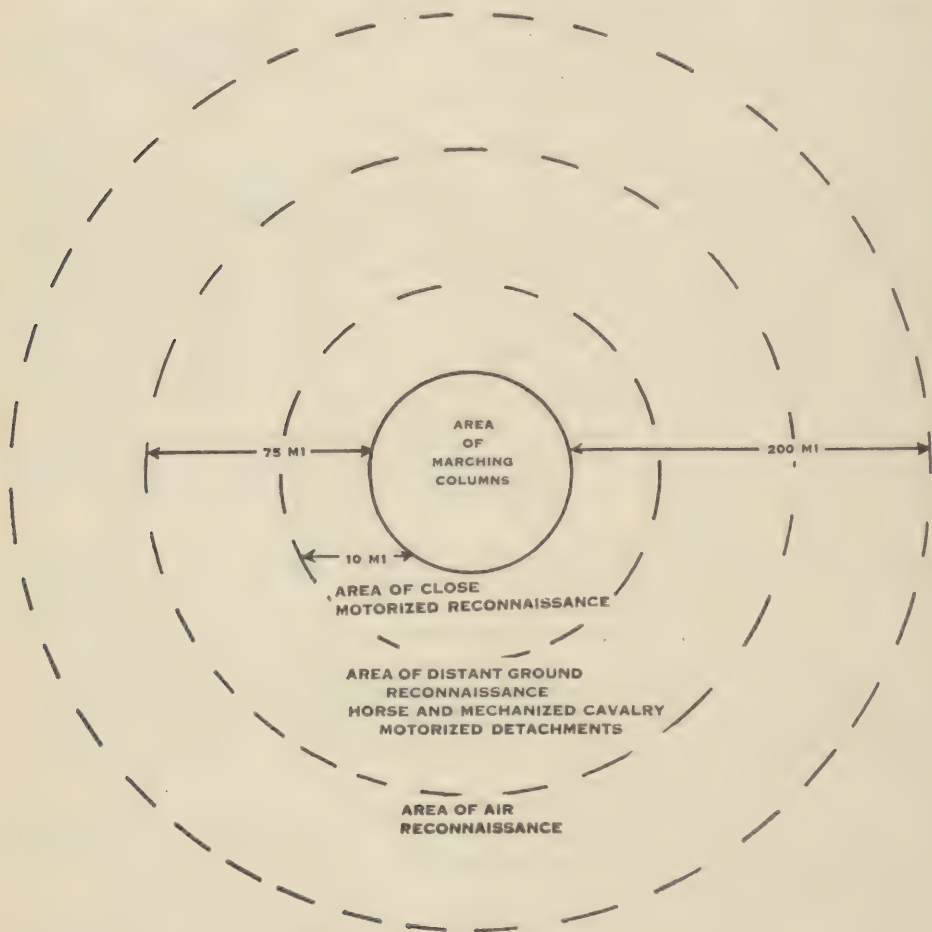


Plate 3. Reconnaissance Areas.

a series of delaying actions on successive positions. This action involves deployment on a strong defensive position overlooking the route of advance of the enemy toward the rear of the protected main body. Upon his approach long range fires are directed upon him to force him off the roads, into deployed formations, and to form for an attack. When he has been thus delayed (the main body having gained additional time as well as space), the rear guard withdraws quickly, moves rapidly to a new position, and repeats the process as many times as may be necessary. It cannot defend on one position for to do so would result in being over-run by a strong force, it would be separated from the main body, or the position might be encircled and avoided. A delaying action in successive positions is more in consonance with the nature of the usual rear guard mission.

In all of these illustrations it must be remembered that the power of the enemy may be too great for the security elements to control. Reinforcement of the advance guard

flank, or rear guards may be necessary. In an extreme case the employment of the entire force may result. But if this becomes necessary, the security detachments must gain time for the main force to develop and take up battle formations.

Missions Appropriate to the Separate Arms and Services in the Protection of Marching Columns. Advance guards, flank guards, and rear guards which are constituted from a force of the combined arms are usually formed from two or more of the separate arms and services, depending upon the size of the detachment, the capabilities of the enemy, and the nature of the terrain. Appropriate functions of the separate arms and services in the service of security for marching columns are as follows:

Observation aviation. Observation aviation executes distant reconnaissance to the front and flanks of a large force in march. It seeks to locate large enemy forces, determines their size and components, and observes their movements. It makes a prompt report to other arms on missions of distant reconnaissance, such as cavalry, as well as to the commander. It has no offensive mission since it is not equipped to attack ground troops.

Cavalry. Cavalry is well adapted for the protection of large columns in march. It can operate over a broad front well in advance of the main force. By thorough ground reconnaissance it can search out the hostile forces which may constitute a threat. By the use of its power and mobility it engages in offensive or defensive combat, as the situation may require. It can seize and hold important terrain features until the arrival of the main body or other security elements. It can execute counterreconnaissance to prevent the ground agencies of the enemy from observing the main body.

Motorized infantry. Infantry units may be furnished with motor transportation, or they may have it as organic equipment, so that they may perform missions as described above for cavalry. In fact, they may operate in conjunction with the cavalry or relieve the cavalry on a part of the perimeter of the zone of security. When these detachments are formed they are usually reinforced with heavy weapons of the infantry battalion, truck-drawn light artillery, antitank units, an engineer detachment, tanks if available, a signal detachment, and a medical detachment from the division medical service. It then becomes a strong, self-sustaining force capable of considerable independent action.

Infantry. Columns in march, whether afoot or in motor transport, must be protected with advance guards, flank guards, or rear guards as may be required. The bulk of these units is drawn from the infantry. They provide close-in protection of the columns and protect the columns from aimed small arms fire, as a minimum, and fire from hostile light artillery within effective ranges, as a maximum.

Field artillery. Security detachments, particularly advance guards and rear guards, may have light artillery support. This adds greatly to the available fire power and enables the enemy to be engaged at long ranges.

Engineers. A detachment of combat engineers may accompany security detachments to remove obstructions which may have been prepared by the enemy, assist vehicles over difficult terrain, construct obstacles, and execute demolitions as may be appropriate.

Signal corps. A signal detachment may accompany security detachments, particularly those operating at considerable distances from the main body, so that the commander may be informed promptly of changes in the tactical situation and of the needs of the troops.

Quartermaster corps. The quartermaster component of the division has sufficient motor transportation to provide transport for a battalion of infantry. Motorized detachments will obtain trucks from this source. Supply of quartermaster articles must be continuous, and instances may occur where this is extended to units in the service of security.

Medical department. A detachment from the division medical service will usually be assigned to accompany units in the service of security to provide for collection and evacuation of casualties.

Bivouacs and Bivouac Areas. Troops halted for periods of several hours or longer must be protected against attack or interference by an enemy. During these long halts troop units occupy bivouac areas.

The simplest form of bivouac is obtained by halting a marching column, movement off the road into suitable adjacent areas along the route of march, and decentralization to subordinate commanders, such as battalion commanders, of the activities conducted during the halt. This method has the advantage in that all units of a long column halt

at the same time; units at the tail are not required to continue marching to close into a prescribed area to the front. When the march is resumed, units take their places with only minor rearrangements in the order of march. The disadvantage of the method is that the area of the bivouac is very deep with the consequent difficulty of control; it is especially undesirable in case of attack by hostile ground forces since the command cannot quickly occupy suitable areas in battle formation. Hence, this form of bivouac is unsuited to the conditions which are to be expected when contact with an enemy is possible.

The other form of bivouac consists of closing the columns within an area of suitable size to enclose the entire command. The width of such an area is approximately equal to the front of a force marching in several columns and is therefore somewhat dependent

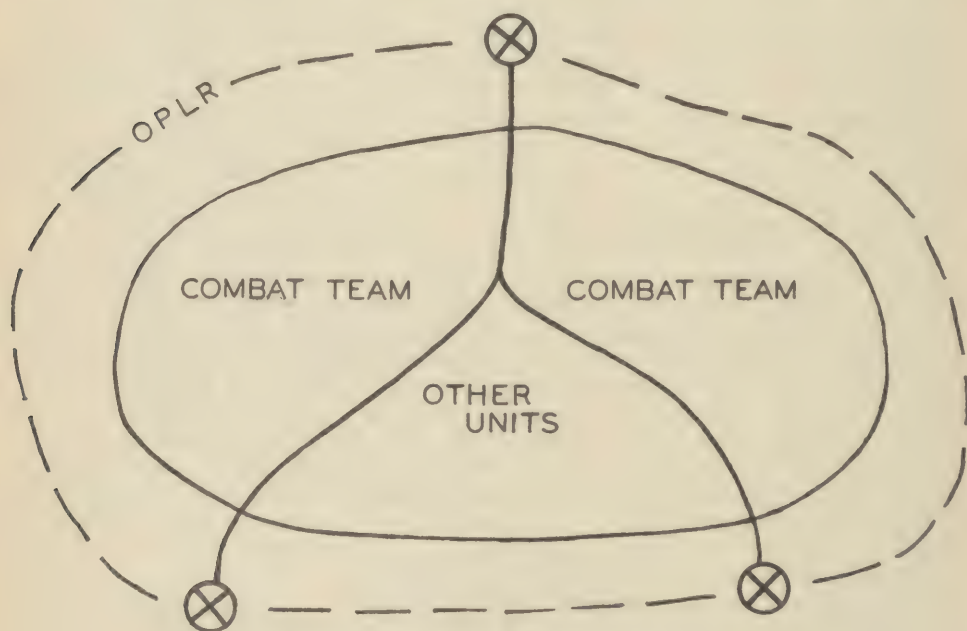


Plate 4. Diagram of a Bivouac Area.

upon the road net. In any event it is wide enough for the force to occupy a defensive position. Its depth is shallower than its width.

A war strength infantry division might occupy a bivouac area 7 miles wide and 4 miles deep.

Plate 4 is a diagrammatic illustration of such an area. Note that infantry-artillery combat teams are placed together in bivouac; this facilitates entry into combat, if that should become necessary, or the resumption of the march in combat teams. Other units of the division are grouped within the area as shown.

The selection of a bivouac area is a function of command. Hostile capabilities must be considered. The best bivouac area utilizes terrain which has strong defensive possibilities, is adequate in size, has obstacles across its front and flanks, and provides concealment from hostile observation aviation.

Security of Bivouac Areas. Security is provided for units in bivouac under the same guiding principles as for marching columns. Warning of the approach of strong hostile forces must reach the commander of the main force in time to take the measures which are required by the circumstances. The advance of small raiding or reconnaissance parties sent out by an enemy must be blocked so that the main force cannot be observed or suffer interference.

The distance to the front, flanks, and rear of the bivouac area to which protection should be provided varies in accordance with the size of the command, the hostile capabilities, and the terrain. As a minimum a force in bivouac should be safe from hostile small arms fire; as a maximum it should be free from hostile artillery fires.

Covering and Reconnaissance Forces. A large force in bivouac may be protected by the same covering forces and reconnaissance agencies as described and illustrated for marching columns. In fact, a bivouac of a large unit for a period of several hours may have no appreciable bearing on the action of these forces since they operate at distances which may be equal to several days' march of the unit protected.

Close-in Protection of a Bivouac Area. Just as a force in march protects itself by advance guards, flank guards, or rear guards, as may be required, a force in bivouac provides for its own close-in protection by an outpost, notwithstanding the activities of covering forces consisting of cavalry or motorized infantry. This security measure involves the use of a fraction of the combat strength of a command for the protection of its bulk.

The installation of an outpost system is often decentralized by the commander of an independent force to the commanders of his largest combat teams; in this case the commander will prescribe the sector of responsibility of each main component, the location of the most advanced elements of the outpost, definite points of coordination between adjacent sectors, and special precautions to be observed such as antimechanized and antiaircraft measures. For example, refer again to Plate 4. The commanding generals of the two infantry brigades and the commanding officer of the 1st Engineers, a combat unit, may each be assigned definite sectors of the outpost. The crosses enclosed by circles indicate the exact location of points where coordination is to be obtained. The action to be taken in case of attack is prescribed.

In accordance with these instructions sector commanders assign units of their own forces to form the outpost and appoint an outpost commander. An outpost consists of an outpost line of resistance (OPLR), supports, and reserves. A large outpost may include artillery. Antitank guns are usually included. The troops on the OPL are in small groups, such as a rifle squad, placed on ground with good observation and defensive characteristics. These units may be widely separated, depending upon the visibility to the front and flanks. Areas between these small groups are covered by periodic patrolling, especially at night. Supports are placed in rear of the OPL, so situated that they can move quickly to reinforce any part of the outpost which may be threatened. The reserve of an outpost is held under the control of the outpost commander for use in blocking or counterattacking a hostile force which penetrates the OPLR in order to prevent it from gaining contact with the main force. See "Infantry in Security," Chapter III.

By this method a force protects itself during the periods when it is halted in bivouac. While the main force should be reasonably free from attack, if the hazard is great the position may be organized for defense and the men may rest or sleep in or very close to the actual positions each would occupy in case of attack.

Action of an Outpost When Attacked. When an enemy attempts to penetrate an OPLR, information of the location and strength of the threat must be communicated quickly to the outpost commander. Thereafter, units of the outpost operate in accordance with their prescribed mission. Small raiding parties and patrols should be blocked by fire. If an attack is made in force, prompt reinforcement of these small units may be made to enable resistance to be made in the forward areas. In other cases the units on the OPLR may be directed to fall back when forced to do so to a defensive position. In still others these small units may have fulfilled their mission merely by giving warning of the hostile approach. The latter would be unusual. Thus the action to be taken by an outpost in case of attack should be definitely established in orders. It may be to defend the OPLR, in which case units should be quickly reinforced; they withdraw only on orders of the outpost commander. It may be to fall back when forced to do so into a defensive position outside of the bivouac area. Or the mere giving of warning followed by withdrawal into the bivouac area may suffice.

Missions Appropriate to the Separate Arms and Services in the Protection of Bivouac Areas. *Observation aviation.* Distant reconnaissance to the front and flanks of the force

in bivouac. It makes prompt report of hostile large forces, including their composition, size, and movements, to the other arms on missions of reconnaissance, such as cavalry, and to the commander.

Cavalry. Cavalry, either horse or mechanized, is well adapted for covering force missions. It executes reconnaissance and counterreconnaissance, and engages hostile forces which are advancing toward the main force.

Motorized infantry. Motorized infantry units, reinforced as the situation may require, may perform covering force missions in the same manner as cavalry.

Infantry. The bulk of the units on outpost are drawn from the infantry.

Field artillery. A large outpost will include field artillery. Some units may be placed in position areas outside of the bivouac so that targets may be engaged at long range. Others are placed within the bivouac area and prepared to fire in close support of the OPLR.

Engineers. Engineer units may be used to protect a bivouac area by constructing obstacles, such as road blocks at defiles, and by executing demolitions in areas which will not be required by the future action of the force. For example, flank protection may be increased by destruction of bridges.

Signal corps. The signal component of the force will maintain constant contact with units in the covering force and with the outpost commander so that the force commander may know the tactical situation at all times.

Quartermaster corps. The quartermaster component of the force will supply additional vehicles for tactical missions.

Medical department. Plans must be made to evacuate wounded from the OPLR to the bivouac area in case of attack.

OFFENSIVE COMBAT

Offensive combat is employed to secure a decision over a hostile enemy force with which contact has been gained or can be gained. The winning of a decision, in its ultimate application, requires the destruction or capitulation of the hostile force. The ends may be gained in a lesser degree by the dispersal of the enemy as an organized military force capable of further resistance, or even by forcing his evacuation from an area if that degree of success is in accordance with the assigned mission. Most wars continue until one force gains a complete mastery over the other to a point, at least, where it is obvious that further resistance can result only in destruction and annihilation. Thus, as a principle, decisive results are obtained by the offensive only, insofar as it pertains to winning the victory on the battlefield.

After the initial contact has been gained the commander must make an early decision as to the future action of his force including *what* it is to do, *when*, *where*, and *how* it is to do it. The decision must be followed by a plan for its accomplishment.

If his decision is to attack, it will be *coordinated* or *piecemeal*, a *penetration* or an *envelopment*.

Coordinated Attack. A coordinated attack presumes complete development of the force prior to attack, that each component is in position as the action commences, and the force operates in accordance with a prepared plan as expressed in orders which prescribe a definite objective for the whole force and a definite mission for each of its components. It is in contrast to a piecemeal attack.

Piecemeal Attack. A piecemeal attack is delivered prior to the development of the whole force. Units enter the action successively as soon as each reaches the battle area and without waiting to obtain complete coordination. Shortage of time to make a coordinated attack is the usual factor which requires the piecemeal attack. The assigned mission may require completion within such a limited time that no other form of attack can be executed. Or hostile reinforcements may be able to arrive on a front prior to the time a coordinated attack can be driven home.

Attack by Penetration. An attack by penetration is a frontal attack directed against an enemy in position which seeks first to pierce his position and then to rupture it entirely

A penetration strikes the enemy where he is known to be prepared to defend, in contrast to an attack by envelopment which seeks to avoid the hostile defenses (see Plate 5).

Resort must be made to attack by penetration when the enemy occupies a position which offers no flanks for envelopment (obstacles protecting the flanks, protection of units on the flanks, unfavorable terrain), or under conditions where the factors of time and space do not permit attack by envelopment, a more time-consuming procedure.

Resort may also be made to attack by penetration when this form offers the best chance of success. A hostile force in seeking to "defend everywhere" may so over-extend itself or fail to hold adequate reserves as to present a weak front inviting penetration.

Attack by Envelopment. An attack by envelopment consists in attacking *both* the hostile front (holding or secondary attack) and one or both flanks (main or decisive attack).

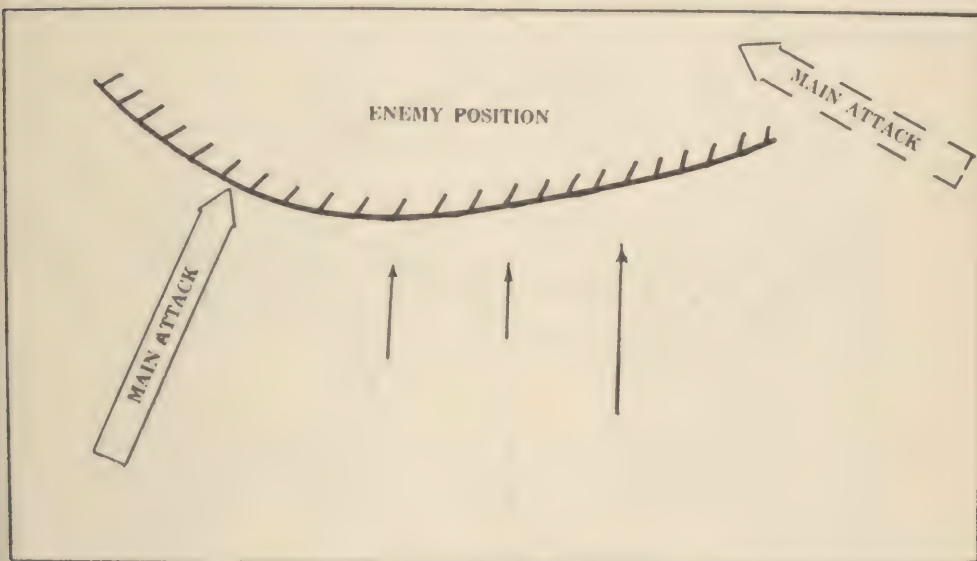


Plate 5. A Penetration and an Envelopment.

Attack by envelopment seeks to direct the main attack through an area outside of known hostile organization to an objective behind or on the flank of the enemy position. The flanks and rear of a force are its vulnerable localities. The rear portions of a position contain the command, communication, and supply installations, the supporting artillery, and the formed reserves. Analysis of battles throughout all history indicate that the vast majority of decisive attacks have been envelopments. The Great Captains have each been past masters of the art. The defender will seek to determine the position and location of the main attack so that he may move to block it. He may be deceived and surprised. He may be prevented from taking a desired course of action by the holding attack or the progress of the main attack. Further, attack by envelopment forces the enemy to diverge his fire in two or more directions while the fire of the attacker converges upon him. (See Plate 6).

Attack in a Meeting Engagement. A meeting engagement is a collision between two opposing forces, each of which is more or less unprepared for battle. It may ensue without the collision element when one or both decide to attack without delay, or when one decides to deploy hastily for defense while the other attacks quickly before this defense can be organized. The element of speed is present on the part of both forces, whatever their action.

The initial combat is between covering forces or advance guards. Advance guards may be quickly reinforced, particularly with artillery. Thus the action may flow from combat

between covering forces to advance guard action to development and attack by the entire force. (See Plates 7 and 8).

While this action is proceeding the commander will decide on his future action by weighing his *mission*, the *tactical situation*, the *terrain*, and his own will, the *will of the commander*.

If he decides to attack he will direct the advance guards to continue their attack to discover the enemy's location, strength, and intentions while he assembles the bulk of the command in an assembly area preparatory to movement to attack positions and launching of the attack.

Attack against an Enemy Deployed for Defense. A hostile force which foresees early contact may deploy for defense at once, occupy positions, and attempt to organize them in order to receive the expected attack. The situation presented is of an enemy who has placed his troop units in defense but has not yet completed the organization of the ground or coordination of defensive fires. Given time he will finish this work. The passage of time favors the defender.

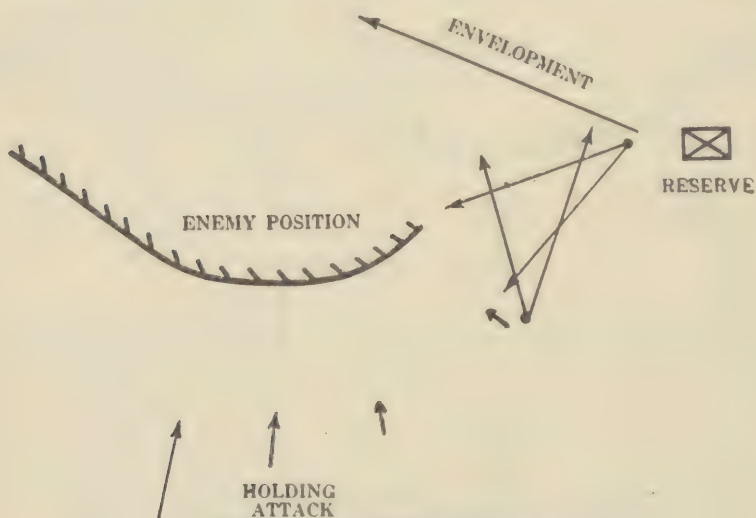


Plate 6. An Envelopment.

The attacker who discovers this situation will wish to act quickly. Since his enemy is actually on his defensive position a coordinated attack must be made. Speed is a vital factor. Secrecy with rapidity of movement to attack positions may enable him to obtain surprise. It is often difficult to decide on the proper time for an attack. Assume, for example, that an attack can be launched today over fairly suitable terrain, or that by delaying the attack until tomorrow the main attack force can move to more distant attack positions which are ideal. The commander will tend to attack today over the less desirable terrain for to delay will allow the defender to carry his organization more nearly to completion.

Attack against an Organized Position. An enemy in an organized position has occupied a battle position of his own choice, troop units have been placed after careful study to withstand attack from any direction, his defensive fires have been coordinated and the position protected by an outpost and possibly by covering forces. It may be assumed that he has made the most of his opportunities.

Under these conditions the time the attack is made, whether today, tomorrow, or later, becomes a less vital consideration. The enemy may be well able to withstand all but the strongest attack.

Reconnaissance must be made to uncover the hostile main position since it is protected, we may assume, by an outpost and by covering forces. These units must first be driven in. The flanks must be explored, their position fixed, and units in flank protection, such as

cavalry, driven back. The main position must be studied to determine its areas of greatest strength and greatest weakness. All this will often be necessary before the decision and plan of attack can be made.

It then becomes a matter of concentrating the maximum power of the attacker in the vital area selected. Surprise remains an important advantage to the attacker. The fact that an attack is in preparation may be perfectly apparent. But when the attack will be made, the locality and direction from which it will come, and its intensity will not be disclosed until it is started. Feints, deceptive measures, and secondary attacks will assist the decisive action. It is a power attack in which speed in planning and delivering the blow has a reduced importance.

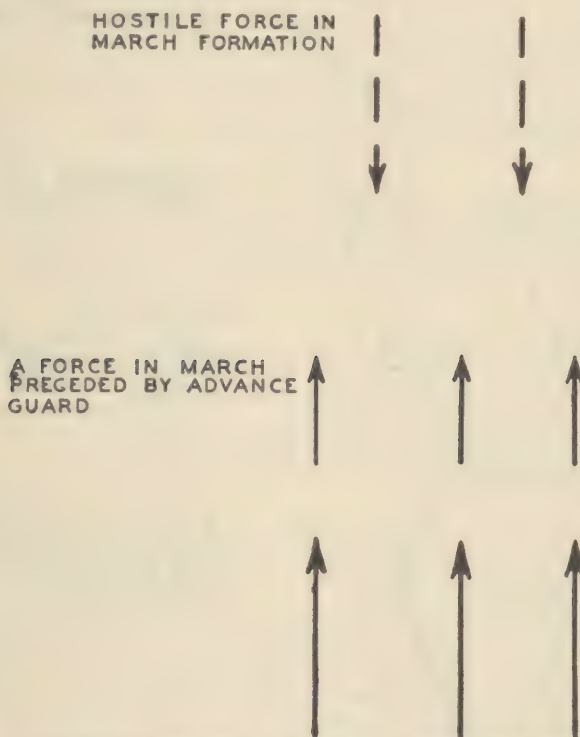


Plate 7. Attack in a Meeting Engagement. Situation Prior to Contact.

The task presented may be beyond the powers of the unit planning the action. In such a case reinforcing units as may be available or necessary are attached for the duration of the action. In addition, the support of attack aviation may be provided. Reinforcing units may include all or a portion of the following: observation aviation, light artillery, medium artillery, antiaircraft artillery, heavy artillery, tanks, and chemical units.

Attack of an organized position presents the most difficult undertaking which may be assigned to attacking troops. Time must be taken to determine the best course of action, to prepare fully, and, if necessary, secure the services of reinforcing units.

Commander's Choice of the Form of Attack. The commander is concerned first of all, with securing a decisive victory in compliance with his mission and, second, with the accomplishment of his will in the shortest time with minimum casualties. *He will choose the form of attack which, in his judgment, will most surely result in success.*

Effect of the Mission on the Decision. The employment of military forces in battle, whether large or small, involves the prescription by higher authority of a mission. The nature of this mission may be definite in the extreme as, for example, to attack a hostile position at or before a stated time. Or, in other cases, the mission may be general in

nature and the commander authorized to take such tactical action as he deems best to carry out the mission. Illustrative of such a condition, the commander may be required to deny the enemy access to a prescribed area; in the execution of this mission he may elect to defend on one position, to fight a delaying action in several positions, or to attack in order to eliminate the hostile force which threatens him. The mission assigned a separate and independent force may consist of several requirements; it may be required to protect a flank of a larger force, to delay the arrival of hostile reinforcements, and to block a hostile advance beyond a definite line.

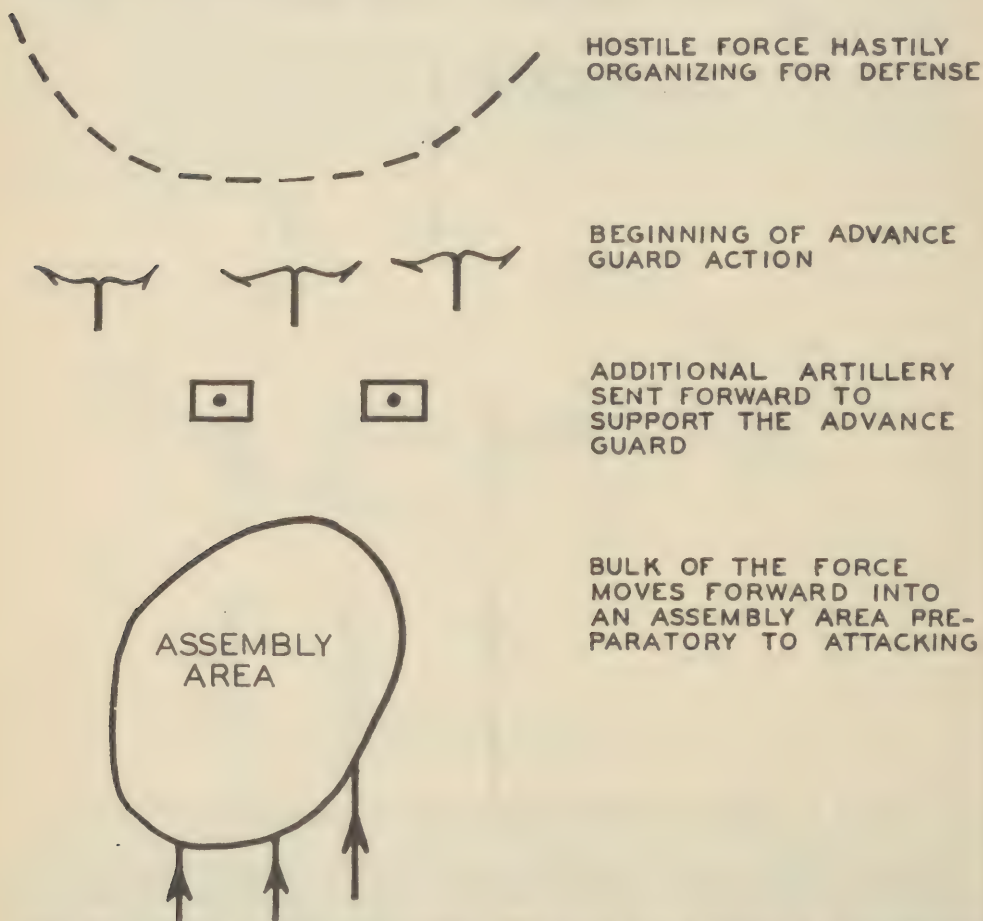


Plate 8. Attack in a Meeting Engagement. Advance Guard Action and Preparations for an Attack.

Whatever the assigned mission, the commander must satisfy its requirements in arriving at his decision. The latitude allowed him may permit the choice between attack, defense, or retirement. Or, the requirement that he attack being clear, he may have freedom of choice as to timing the attack, such as to attack at once, without delay, at a definite time on the same day, the next day, or at a still more deferred time. In still other cases the direction from which the attack must be made may be included in the requirements of the mission.

Thus it is clear that the conditions which confront a commander with respect to the mission and its accomplishment approach infinity. But there are two principles which remain: *First*, within the limits of the means available to him, including his own resourcefulness, skill, and leadership ability, *he must accomplish his mission. Second*, he must make

that decision and plan which, in his own judgment, will most surely result in the accomplishment of his mission *in the least time and with the fewest casualties*.

Effect of Terrain on the Decision. Only rarely will the nature of the terrain determine whether the commander should decide to attack or defend. In the usual case that is predicated upon the mission. The nature of the terrain when studied in connection with the enemy's known position and organization will determine *where* the main attack will be made. By choice of the best terrain over which to make the advance the commander seeks to reduce the hazards of the main attack force while increasing the difficulties of the defender.

Unfavorable terrain is flat, open country dominated by higher ground occupied by the enemy who must be defeated if the objective is to be reached. Movement in such areas forfeits the vital factor of surprise, exposes the attacker to observation and to aimed fire of all weapons within range. Such routes of advance are usually accompanied by lack of suitable locations from which to observe and adjust the fires of supporting artillery as well as the heavy weapons of infantry. Where there is a choice, avoid areas which can be swept by aimed hostile fire.

Favorable terrain, on the other hand, provides at least a measure of concealment from hostile observation, protection from his aimed fire, and points of elevation—hills—from which the fire of his own supporting weapons may be observed and adjusted. Vegetation such as woods or scattered patches of trees provides concealment. The best protection from aimed fire is dirt—hill masses or ridges separating the zone of advance from the known hostile position.

The attacker seeks a corridor leading into or towards the objective. A stream valley is a corridor. To be suitable its width must be sufficient to accommodate the frontage of the attacking unit. A corridor serves as a useful check on the maintenance of direction during the advance. When the attacker can retain control of the high ground overlooking the corridor he is able to exclude aimed fires into the flanks of the assault units, a vital factor in a successful attack.

Selection of terrain is a matter of the utmost importance. But *use* of the terrain over which the advance must be made is also a vital factor. Subordinate units will rarely have the choice of the areas of their advance. They must make the best use of whatever ground is allotted to them. This involves selection of routes by subordinate leaders, such as squad and platoon leaders, avoiding areas of greatest danger; the use of formations which reduce the vulnerability of the unit, such as small columns at wide intervals; crawling, if need be, to advance without exposure around or over exposed terrain; crossing of shallow, exposed areas at a run. The commander of the force does his part by selecting the best area over which to direct the attack. But this must be accompanied by skill and resourcefulness in the use of ground by subordinate leaders if the benefits of this selection are not to be nullified.

Plan of Attack. The decision to attack will include its form and objective and is accompanied or followed by a plan of attack or scheme of maneuver. The plan will provide a mission for each component of the force, the sum of which is intended to secure the decision.

Included in the plan will be the designation of the units to execute the *holding or secondary attack*, the units to execute the *main or decisive attack*, as well as the units to be placed in *reserve*. All attacks include provision for these elements with the area in which each is to operate, their mission, their timing and coordination.

Holding Attack. The holding or secondary attack seeks to fix to the ground the enemy opposed to it and to attract hostile reserves to its front. Success of the main attack often depends upon the skill and aggressiveness with which it is conducted.

In a meeting engagement the troops in the advance guard, in part at least, will often make the holding attack. After contact is made pressure against the hostile force is maintained by fire action or by fire and movement. If he weakens his position to move troops to other locations the gaps will be exploited. As a further aid to the main attack force, a *principal effort* is launched in conjunction with the decisive attack or in advance

of its delivery. This is a strong attack supported by artillery and is directed towards a definite objective somewhat shallower than the objective of the main attack.

The importance of the holding attack in its effect upon the outcome is too often minimized in practice as well as in study. It is very important. In some ways it requires a

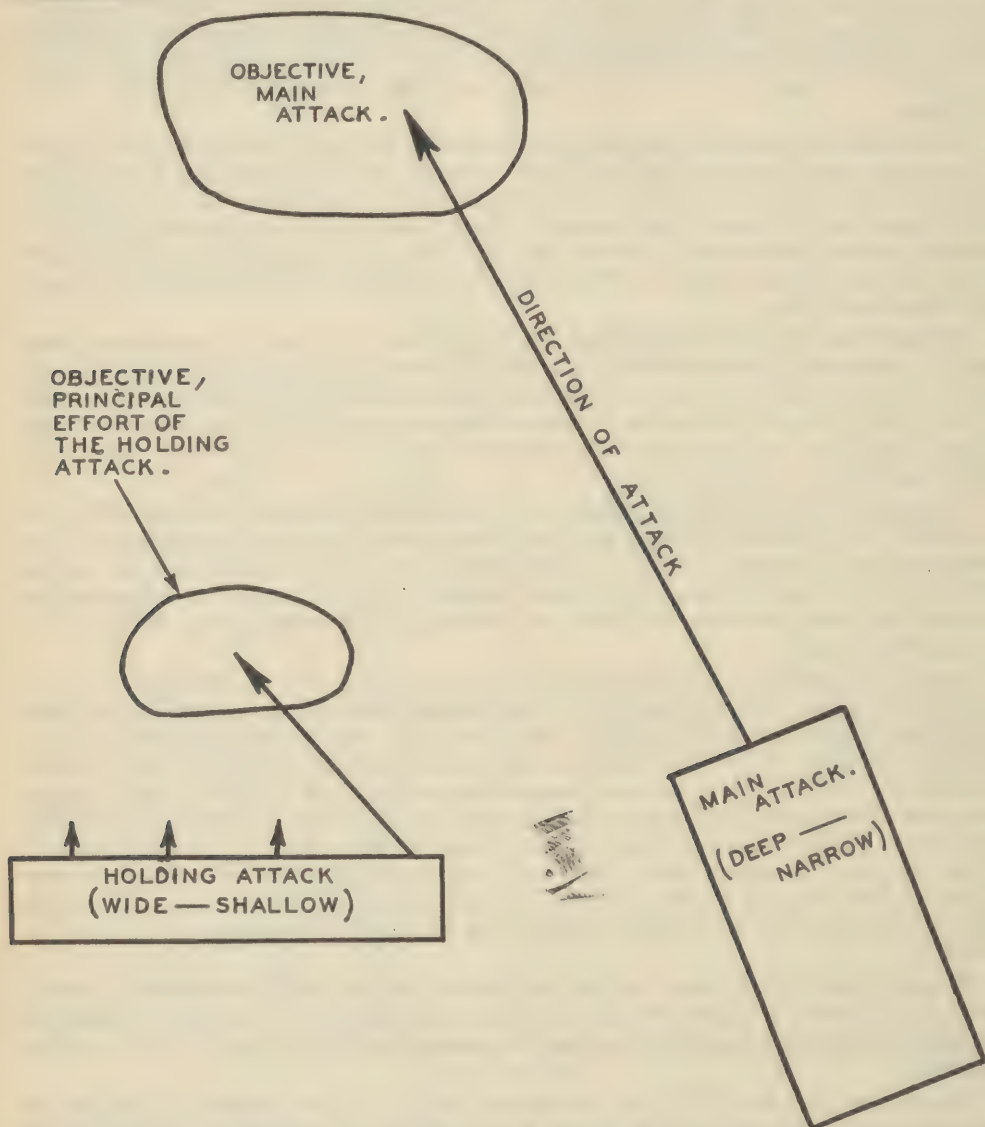


Plate 9. Diagram of Holding and Main Attack Forces Showing Formations and Depth of Objectives.

greater skill than the delivery of the main attack which, after all, is allotted the bulk of the means. Its action is partly deception and partly power. It is not a weak attack. Units attack on a wide front and in shallow depth; in this way they develop their maximum power quickly. By attacking on a wide front the depth of their attainable objectives is reduced. It is poor reasoning which leads to a decision to assign a mission obviously beyond the capability of a force to accomplish. The element of deception which is introduced is to make it easier for the enemy to draw erroneous conclusions, a startlingly easy matter on the battlefield.

Aggressive conduct of the holding attack will aid the main attack by confusing the enemy as to the location of the decisive area and by holding in position his troops which have been engaged. If the element of deception succeeds, his reserves may be directed to this front.

The strength of the force making the holding attack is usually a minor fraction of the infantry component. In no case should it be stronger than that required for the assigned mission. The bulk of the infantry must be saved for the decisive attack. However, it should be provided with strong artillery support. For purposes of illustration, a war strength infantry division (square type) has 12 battalions organized into two brigades of two regiments each. The artillery component consists of two regiments of light artillery and one of medium artillery. To the holding attack force might be allotted one infantry brigade less one battalion, or a brigade less two battalions, or a brigade less a regiment. In support of the holding attack might be placed one regiment of light artillery and one battalion of medium artillery. The remaining combat elements, except one or more battalions in division reserve, would then be available to make the main attack. Thus it is seen that a brigade commander and staff are available to command the holding attack. Further, the holding attack is stripped to the minimum strength commensurate with its mission in order that the bulk of the force may be available for the decisive effort. The division commander exercises control of the entire force through the infantry brigade commanders, each in charge of a phase of the attack, and his artillery commander providing the fire support. (See Plate 9).

Main Attack. The main attack is planned to be decisive, to win the victory. It is given the bulk (more than half) of the means available to the commander. It seeks to strike the enemy where he is least able to resist effectively. It seeks to mass a superior force against the enemy *in the area of the attack* in order to drive rapidly to an objective from which the destruction of the hostile force may be completed.

Surprise is an important factor in its success. The massing of units to make the attack must be so executed that the enemy will receive the attack before he can move to meet it or before he can prepare completely to meet it.

It has been pointed out that the holding attack is delivered in shallow depth and great width so that the maximum strength can be developed quickly. The forward movement of the main attack force is on a narrow front and in great depth so that continuity of action may be maintained. As one unit encounters resistance, is blocked, or suffers heavy casualties, a new and fresh unit passes through and continues the forward movement or maneuvers around the resistance to continue the advance. A series of strong blows may then be struck in a manner which will be the most effective.

The goal is to concentrate in an area a greater power than the enemy can bring to bear against it. Past experience indicates that time and again the application of this principle has attained the victory, even permitting weaker forces to defeat the stronger.

Coordination. Arrangements must be made by the commander to provide for coordination of effort between the components of his force.

Infantry. Attacking infantry units within adjacent areas require coordination of the time of their advance, the direction, objective, and the zone within which each is free to maneuver. This is obtained by prescribing a line of departure, a time to leave this line, right and left boundaries (flank units do not require an exterior boundary), and a definite objective.

Artillery. Coordination is required between artillery units, and between artillery and supported infantry. Each artillery battalion is given a definite sector of responsibility within the limits of its range and instructions as to firing restrictions. Battalions are then placed in position areas so that all parts of the battle area may be covered with adequate supporting fires. Contingent zones may be assigned to each battalion equivalent to an overlap of the areas of responsibility of adjacent battalions within which they are to be prepared to fire on call in support of adjacent units. Coordination with the supported infantry units is obtained by liaison detachments, personal contact, and observation.

Coordination between Subordinate Commanders and Staff Officers. A vexing phase of operations in the field is the oft-repeated selection by one commander of an area for his use

which, all unknown to him, has been selected by another for a conflicting purpose. For example, Hill 106 may be selected as a position for machine guns, as an artillery observation post, and as a location for antitank guns; or the defiladed area in rear of the hill may be chosen for a command post, an aid station, and as an ammunition distributing point. Unit commanders and staff officers making these selections must adjust these matters, foresee and avoid them, and be ready to accept a prompt give-and-take to the end that all necessary establishments are able to occupy suitable localities with speed and precision. In practice, able commanders and staff officers adjust these conflicts as a matter of course.

Movement of Troop Units Prior to Launching the Attack. Prior to the actual delivery of an attack the troop units, particularly of the main attack force, must move to attack positions. Reconnaissance must be completed, orders issued, and coordination of the entire effort obtained.

This movement involves occupation of an assembly position close to the line of departure, followed by movement to the line of departure in time to start the attack in correct formation at the prescribed time. The movement must be screened from hostile ground observation and protected from interference. Very often it will be completed at night.

Conduct of an Attack. Assault units execute the several phases of attack, including the approach march, the fire fight, the assault, and continuation of the attack aided by the supporting fires of infantry heavy weapons and artillery. The techniques employed by infantry and field artillery in attack are discussed in sufficient detail for the purposes of this volume in Chapter III, "Tactical Functions of the Arms."

Use of Reserves. "Victory is to him," said Napoleon, "who can put in the last reserve."

It is never possible to foresee exactly how an attack will progress, how the enemy will react, the emergencies which may arise, or the opportunities which may be presented for exploitation. For these reasons a commander will retain a portion of his infantry strength in reserve during the initial stages of the action. He will use this force at the time and in the manner which he decides will have the greatest effect upon the outcome of the battle. Such uses may include the following: the blocking of a hostile counterattack, relief of a unit which has spent its force in action, extension of an envelopment to reach the objective, or the exploitation of a success by initiating prompt pursuit.

Subordinate commanders retain a portion of their infantry strength in reserve for similar reasons. The commander of the holding attack will require a unit of suitable size with which to deliver his principal effort. The commander of the main attack will employ a narrow front with a portion of his force while placing the remainder in depth. Similarly, assault battalions of infantry may place one or two companies in reserve; a rifle company might hold one or two platoons in reserve. In principle, the smaller units will tend toward early use of their reserve. The commander of the force will wish to retain control of his reserve until the decisive opportunity for its employment is presented. In open warfare, the use of motor transport permits the prompt engagement of reserve units at distant points.

Missions Appropriate to the Separate Arms and Services during the Attack. *Air force.* Attack of ground objectives which will be of direct assistance to the attacking troops. Protection of the attacking troops against hostile aviation. (See Chapter III.)

Observation aviation. The execution of reconnaissance missions, missions for infantry and artillery, and command missions incident to control and communication.

Cavalry. Cavalry units attached to an infantry division or corps are available for use in reconnaissance and counterreconnaissance, development of the hostile position including the driving in of his covering forces and uncovering of his flanks. During the attack they may be used to protect the exposed flanks of the attacking troops, to delay the arrival of hostile reinforcements which can reach the battle area before the attack is driven home, and they may be used in the decisive phase of an attack for action, particularly against the hostile flanks and rear. After a successful attack cavalry may be used in exploitation.

Infantry. Infantry units will make the holding attack and the main attack. Following a successful attack they will execute the exploitation in conjunction with other units.

Field artillery. Light artillery will operate in direct support of designated infantry units, in the usual case. Close contact will be maintained between the artillery unit commander and the commander of the unit supported. Liaison detachments are provided so that fires may be delivered as desired by assault battalions of infantry. Medium artillery operates, for the most part, in support of the light artillery by engaging targets beyond the range or power of light artillery or by increasing the intensity of its fires. Counterbattery fires are executed by medium artillery to neutralize or destroy hostile artillery units whose positions are discovered. An essential part of artillery action is its flexibility and range; it may mass its fires within a wide and deep area, by employing its long range, so that a large portion of a front may be engaged.

Combat engineers. Combat engineer units may be directed to stand prepared to assemble at a designated point within a time limit in order to engage in combat.

Signal corps. Units of the signal corps, such as the signal company of an infantry division, establish and operate the message center of the command, install and operate signal communication facilities to the headquarters of the principal subordinate components and attached units.

Antiaircraft artillery. Antiaircraft artillery provides an area defense of installations, troop units, and localities as directed by the commander. Appropriate missions include the protection of the main attack force against air attack, protection of reserve units, the division command post, the railhead, and distributing points. The mission may include protection of essential areas on the line of communications such as bridges, railway junctions, and vital highway intersections or defiles.

Quartermaster corps. The quartermaster corps obtains and distributes supplies which are common to two or more arms and services. This function includes the delivery of rations, forage, gasoline and lubricants on a daily schedule. The mission is completed by placing the supplies in distributing points adjacent to the troops. It provides the stockage of supplies incident to an extensive operation. It controls and services the motor transportation provided for the force except that which is a part of the organic equipment of the subordinate units. Its tables of organization include a limited number of laborers to load and unload supplies at the railhead and distributing points.

Ordnance department. The ordnance component of a field force, such as the ordnance company of an infantry division, square, is responsible for the delivery of small arms ammunition, and for the repair and replacement of many items of ordnance equipment.

The medical department. Regiments of infantry and artillery are provided with medical detachments which function under the direct control of the unit commanders. This personnel operates the aid stations, provides company aid men, and assembles the casualties at aid stations where they are prepared for evacuation by the division medical service. The infantry division has a medical regiment or a battalion, as prescribed in the different forms of organization. This personnel is additional to the medical detachments of organizations and operates under the control of the division commander. It establishes collecting stations and evacuates the casualties from battalion aid stations into these installations. From these points the casualties are evacuated by ambulance to the division clearing station.

The Force Commander during an Attack. The commander of a field force is responsible for all that his unit does or fails to do. Through his staff he will obtain information of the enemy upon which to base his future action. He will make the decision and announce the plan by which it is to be accomplished. His staff will be utilized to complete the details of this plan with respect to each of its many phases. When the completed plan is approved they will disseminate it to subordinate commanders.

After the commander has announced his decision and plan he may visit his principal subordinate commanders to discuss with them the projected operation and make any minor readjustments which this discussion may develop. He should seize each opportunity to visit the subordinate commanders and the troops in order that he may see their operations and be seen by the troops.

He will confer with the chief of staff from time to time to apprise him of supplementary decisions and inform himself of the progress of the operation as received at the command post.

He will plan the future action of the force, seeking to foresee and prepare for all possible developments.

He will determine the time, place and mission for the use of his reserve.

The commander of a field force should use to the utmost the capabilities of his staff and his subordinate commanders. But he is responsible for the decision and the supervision of its execution.

PURSUIT

Purpose. Pursuit must follow closely a decisive victory. It contemplates the destruction of the hostile force, for only in this way are the full fruits of victory to be attained. A defeated enemy who is allowed to retire after breaking contact will be able to reorganize, obtain reinforcements, replenish his supplies, and restore his morale. Thereafter he may again take the field. A defeated force in retreat is demoralized and disorganized. Prompt and vigorous pursuit by all of a commander's resources, despite fatigue and hardship, may result in the delivery of the final crushing blow which will bring hostilities to an end. Campaigns are won by the destruction, dispersal, or capitulation of the enemy, not merely by the attainment of a local tactical advantage.

Time to Initiate Pursuit. The timing of the start of a pursuit is a difficult command decision. Overconfidence leading to a premature conclusion that the hostile force is definitely defeated may lead to a serious reverse. When the enemy is decisively defeated pursuit is launched. This state is indicated by the capture of critical objectives, the diminution of resistance, reports from front line units of the capture of prisoners, the abandonment of weapons, the cessation of hostile countermeasures. Reports from observation aviation should indicate the attempt to form march columns or movement away from the area of combat, the movement of trains to the rear. These items are indications. The commander must consider the actual information which reaches him as verified by his own observation, and when the instant arrives when he is convinced of the enemy attempt to retire he should order the pursuit to start. If he has foreseen this opportunity he will have issued warning orders to the troops so that the launching of the pursuit may proceed without delay.

Method of Executing Pursuit. The technique of launching a pursuit consists of applying *direct pressure* against the front of the defeated force with the early dispatch of *encircling forces* around one or both flanks to intercept and block the hostile retirement. When this situation is gained the two components of the pursuing force complete the destruction of the enemy.

The forces in direct pressure consist of the units in contact with the hostile front. They continue their advance, seeking to overrun the remaining hostile resistance, prevent his reorganization, defeat his covering forces, and prevent the formation of his march columns. The commander will usually decentralize this operation, assigning distant objectives and zones of advance to his principal subordinate commanders. Relentless, continuous pressure is required without regard to hardship, fatigue, or weather for the same factors will beset the enemy. This action continues until the retirement has been blocked by the encircling maneuver whereupon the final destruction of the hostile force is completed or his capitulation obtained.

Encircling forces are constituted quickly from available units and dispatched over a route outside the area of hostile resistance to an area in his rear, there to block his continued retirement by seizing important objectives such as bridges, mountain passes, or strong defensive terrain.

Components of the Force in Direct Pressure. The force in direct pressure includes all elements of the command, less the units assigned to form the encircling forces.

Components of a Force in an Encircling Maneuver. The encircling force must be able to move with speed and be strong in fire power. As it will be separated, perhaps by many miles, from the main force it must be capable of a reasonable degree of sustained action.

Attack aviation. Attack aviation may provide a decisive blow by attacking hostile groups and prevent an orderly retirement.

Observation aviation. Observation aviation can provide the vital information concern-

ing activities in the hostile rear areas, the location of formed columns, and their direction of march. This information is of vital importance in the conduct of the encirclement.

Mechanized units. Mechanized units, when available, are especially suitable for encircling maneuver since the characteristics of their vehicles coincide with the requirements.

Cavalry. Horse cavalry is well adapted for the purpose since it possesses mobility and fire power to move in force at a rapid rate to vital positions in rear of the retiring columns.

Motorized infantry. Infantry units assigned encirclement missions will be taken from the general reserve since they are usually the most available. They will be provided with motor transportation so that they may move in a motorized column.

Truck-drawn light artillery. The power, long range, and mobility of truck-drawn light artillery make it highly important in an encircling force.

Antiaircraft artillery. An enemy will employ his every resource to avoid encirclement, including attack by his aviation. While the column is en route in march column it requires this protection.

Antimechanized units. An enemy provided with mechanized vehicles may be expected to use them to intercept the encircling forces. Antitank guns are needed to attack such forces.

Engineers. A detachment of combat engineers should accompany the encircling force to assist motor elements over difficult terrain, to execute demolitions, and construct obstacles.

Chemical units. The attachment of chemical units to an encircling force provides a means of employing chemical ammunition.

Signal troops. A detachment of signal troops, or other communication personnel, is required. Communication may be restricted to use of the radio.

Medical personnel. A provisional medical detachment should accompany the force to provide for the collection, treatment, and evacuation of casualties.

Summary. While it is altogether unlikely that a commander would have all of the units listed above he will select from the forces available to him suitable components for the mission. He will then appoint a commander and issue instructions, including a definite mission.

Conduct of the Encirclement. The orders to form an encircling force will include the point of its assembly or points where units will join the column. The march objective of such a column will be an area in rear of the retiring columns from which further operations will be conducted in accordance with the situation which is found to exist after arrival. The route of the force will be outside of the area of expected hostile interference so that arrival at the objective may not be delayed. Since an encircling force must operate independently it provides its own security measures.

After arrival at the march objective, information must be obtained of the location of hostile columns and their direction of march. Observation aviation and the reconnaissance vehicles of cavalry are especially suited for this purpose. With the delivery of this information the commander of the encircling force will then select and occupy areas where he can best block the hostile retirement. Upon the approach of the enemy he will cause them to be engaged by long range artillery and machine gun fires in order to slow their rate of movement. The position occupied will be held in order to permit the forces in direct pressure to close in and complete the victory.

DEFENSIVE COMBAT

Introduction. The purpose of this section is to define the essential phases of the defense with special reference to units of the combined arms. It is an integral part of campaign. Throughout long periods of action along an extended front, defensive operations will obtain during far longer periods than the offensive. Ability to present a defended front so strong as to be impregnable to quick penetration permits the commander to strip men and guns from many areas and assemble them in another. When this has been accom-

plished he may strike a decisive blow with strong forces, secure in the knowledge that other parts of the area of contact, perhaps lightly held, will be able to withstand attack.

The defense serves to prevent the enemy from gaining the decision, denies him entrance into certain areas, or weakens the enemy by imposing casualties so as to increase the possibility of a successful counteroffensive against him. Specifically, the purposes of the defense are as follows:

(1) To gain time, pending the development of more favorable conditions for undertaking the offensive; for example, through the arrival of expected reinforcements or supplies, or through better weather conditions.

(2) To economize troops, and to avoid going into battle at a time when, or place where, a decision is not sought, so that as large a force as possible can be held out for a main offensive effort at another place and time.

(3) To keep the enemy out of territory that has tactical, strategical, or political importance, in order to reduce the freedom with which he can maneuver his forces.

There are distinct tactical advantages which lie with the defense. The defender may often choose the ground on which he will meet the enemy. He may then organize his position by selecting the most suitable areas, by field works, by construction of obstacles, by coordination of defensive fires, by the preparation of plans to meet each hostile capability. Communication between the elements of the command is simplified, a vital aid to control.

But there are also important disadvantages. He has forfeited the initiative to the attacker. He cannot know exactly when, where, or in what strength the enemy may attack. There is a hazard in that a long defense may lower the morale of the troops. They may lose confidence in their own offensive powers. They may forget that the real goal of battle is the destruction of the enemy force, not merely to delay the time when a more aggressive enemy may impose his will upon them. On the battlefield decisive results are to be obtained only by the offensive.

Types of Defense. There are but two types of defensive operations. They are differentiated only by the purposes for which the defensive attitude was adopted.

The *passive defense* seeks only to hold a specified area against hostile attacks. The mission of the force may be fully accomplished by blocking action. Counterattacks launched in a passive defense are to eject a hostile force which has entered the position or to counter a threat to the position.

The *active defense* or *counteroffensive* on the other hand, foresees the delivery of a strong attack to gain a decision. Ultimate offensive action is the primary consideration. The force may take a position or action which serves to invite attack. By concealing reserves, or by ability to move reinforcements into the area by rapid means of transport, it may deceive the enemy as to the available strength. Then, after the enemy has developed his force for attack and partially fixed his dispositions, the counteroffensive will be struck with all the power, speed, and surprise of which the erstwhile defender is capable. It is an offensive growing out of a defense, even from a delaying action. Unlike the usual offensive action which seeks to strike an enemy where he is weakest, it seeks to attract strong forces to a desired front, even to invite an attack, and then, when the enemy has placed himself in positions and formations unsuited for defense, to strike the decisive blow. The overly aggressive commander who is prone to minimize or fail to determine hostile capabilities is liable to encounter disaster from such action.

Selection of the Defensive Position. The commander will wish to choose the strongest ground on which to base his defense. His selection will be determined by consideration of the requirements of his mission and the size of the force available to him. Never an easy task, he will make his decision after consideration of the possibilities of protection of his flanks and front by natural obstacles; of fields of fire for his infantry; of observation for his artillery to provide for the adjustment of their fires; of concealment behind the battle position of his mobile reserves and his artillery; of depth of the position so that a local success on the main line of resistance will not rupture the position. Finally, he must be quite certain that the enemy cannot avoid the position to a degree, at least, which would prevent the defender from making dispositions and countermeasures to block his advance,

An interior unit, part of a larger force, will occupy and organize for defense the area allotted or prescribed.

An independent force has far greater freedom of choice and accepts greater hazards. The latter are increased by lack of obstacles to protect the flanks, by absence of dominant terrain, and by a variety of approaches to the position. Flat, open country or gently rolling terrain reduces many of the advantages which otherwise may accrue to the defender.

Lacking obstacles to protect the flanks, an independent force will tend to "refuse" its flanks; that is, they will be bent back so that an envelopment will not pass the position so readily. Reserves from behind the battle position may extend the flanks to present a continuous front to a hostile enveloping attack.

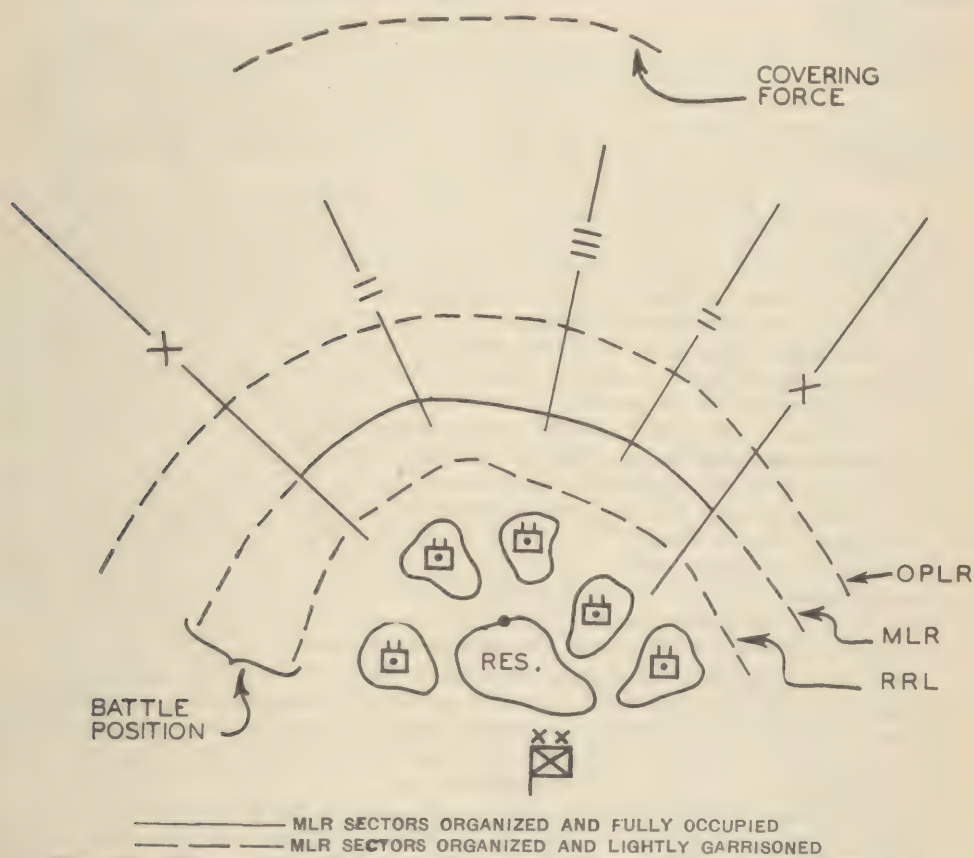


Plate 10. Diagram of a Division in Defense of a Position with Exposed Flanks.

A useful procedure in selecting a battle position is to locate, first, the regimental reserve line, the rearmost part of the battle position. This should be placed somewhat in advance of the dominant observation of the area in order to protect it. The main line of resistance is then located with respect to important terrain localities, elevations which afford good observation and are called "keypoints"; it will be located to provide a depth of the battle position varying from about one-half mile to one mile. The commander will wish to occupy these strong positions and to defend with fire alone the areas which lie between them. Analysis will then be made of the corridors leading into the position, particularly those which lead toward the key localities, for the enemy may be expected to exploit these avenues of approach. When this study has been completed the commander is ready to decide the portion of his force to be committed to the battle position initially, the "keypoints" each is to occupy, organize, and defend, and the units to be held in

reserve. In making these assignments to positions he will assign definite sectors of responsibility.

A force of the combined arms, occupying a position with flanks exposed, requires strong reserves to meet and block any hostile threat which may arise. As a basis for further study of a particular situation, the reserve should include from one-third to one-half the total infantry strength available. Other units (but never artillery) may be held in reserve. This reserve will be used to block the hostile main attack or to launch a decisive counterattack. Its use in dribbles to strengthen hard-pressed units on the battle position would be exceptional. Each subordinate unit assigned to the battle position will also have a reserve component; these units are available to block local penetrations, to make local counterattacks, or they may be withdrawn to constitute a portion of the general reserve.

Plate 10 (not drawn to scale) illustrates the framework of a defensive position with exposed flanks. It shows the battle position, sectors assigned to subordinate units, placement of reserves, artillery battalion position areas, and the location of the command post. It is schematic only and without reference to any terrain or type of terrain. Each defensive position must be developed after analysis of the mission, the situation, and the actual terrain available for organization.

Organization of the Position. Organization of a position includes the initial deployment of the force into the assigned positions and the completion of preparations to resist sudden attack if such action is a hostile capability. This having been accomplished, entrenchments are dug, gun emplacements completed for infantry heavy weapons, camouflage prepared, and definite areas of responsibility for supporting weapons assigned, including lateral coordination with adjacent units. The plan of artillery fires is completed, firing data computed, and coordination obtained with the infantry supporting weapons. Plans are then made for the conduct of the defense to meet each of the several avenues of approach open to the enemy. Obstacles, demolitions, dummy works, observation posts, and communication trenches complete the defensive organization.

As soon as the initial organization has been completed it is safe to hold the position with a reduced garrison of many key points. Accordingly, two, three, or perhaps four battalion sectors on the "nose" of the battle position are fully occupied and a few lightly garrisoned; the remainder may be unoccupied except for personnel in observation. Units which are not held within the battle position are located in reserve, some to be released to subordinate commanders when a threat develops; a strong force, such as a complete brigade, is retained by the commander for use during the conduct of the defense.

There is virtually no end to the organization of a position. As soon as the immediate requirements of the battle position are satisfied, organization of positions extending the flanks will be instituted. The depth of the position may then be increased so that if withdrawal becomes necessary because of enemy action the force may occupy new positions in rear and continue the defense.

The health and comfort of the troops are important when a defensive position is to be held for an extended period. Drainage of trenches, sanitary arrangements, and provisions for shelter to allow men to obtain normal rest are among the important considerations.

Conduct of the Passive Defense. The defender of the position with open flanks, the most dangerous condition which can confront him, must be prepared to repel a frontal attack, check enveloping attacks, and prevent dangerous movements around the flanks. Such a defense is relatively more mobile than the defense with flanks secure. This demonstrates the reason for committing fewer troops to the position and the holding of strong reserves.

The defender must endeavor by all available means to discover the enemy's intentions and the time and place of his attack.

Upon the approach of an enemy he should be engaged by long range artillery fires; for this fire, positions may be occupied in advance of the battle position. These may be followed by fires from infantry weapons. Therefore, when the approach of an enemy can be observed he must advance in the face of defensive fires in addition to overcoming

the resistance of natural and artificial obstacles, demolitions, covering forces, if employed, and local security detachments in advance of the battle position. Since assembly areas are usually occupied under the protection of darkness, defensive fires must be delivered from data previously computed. These are schedule fires which can be delivered on call.

A strong attack may be delayed or disorganized by this action, but it is not to be expected that it can be stopped prior to contact along the main line of resistance. These positions should be held and local penetrations by the enemy quickly counterattacked by units held for the purpose in each battalion sector or by units from the regimental reserve line.

The general reserve (or reserve held by the commander of the force) must be retained until the location of the hostile main attack is definitely disclosed. It may then be used to extend the flanks of the position to meet an envelopment, or to counterattack to restore that part of the battle position which has been seized by the enemy. Premature use of this reserve renders the commander unable to meet further developments which may be decisive. When it is engaged a new reserve should be constituted from units on the battle position which are not under hostile pressure. The defense of a position in open warfare with exposed flanks requires the utmost flexibility, strong reserves, prepared plans, and unerring judgment in estimating the hostile threats. The hostile main attack must be met squarely with strong forces.

Conduct of the Active Defense, or Counteroffensive. The initial phases of the active defense may be entirely identical with the passive defense. In the one the mission is accomplished merely by denying the enemy the accomplishment of his goal. In the other a sudden shift from the defense to the offense is planned in order to inflict a decisive defeat upon an enemy. It may be regarded as a trap in which an enemy may be ensnared. By definition, in an active defense, the counteroffensive is contemplated when the defensive is assumed. The preservation of a large, intact reserve with which to launch the attack is a requisite.

Alluring as this form of attack may seem, and successful as it may have been in past instances, it requires the utmost in advance planning, exact timing in its delivery, and a skillful, cool, and resolute commander to carry it off. Surprise is vital to success.

The ideal time and situation for launching the counterblow is when the attacker has exhausted his forces in the offensive and has consumed his reserves. If the enemy has committed a tactical error, the counterblow should strike before the mistake can be corrected. If the enemy separates his attacking forces widely the counterblow may be directed against one of his elements while containing the other.

Once the counteroffensive is under way, the execution is the same as in an attack.

Missions Appropriate to the Separate Arms and Services during the Defense. *Air force.* Attack of ground objectives in direct support of the defending troops. Protection of the ground forces from attack by hostile aviation. (See Chapter III.)

Observation aviation. The execution of reconnaissance missions, missions for infantry and artillery, and tasks for the commander incident to control and communication.

Cavalry. Prior to the launching of an attack by a hostile force against the defended position, cavalry units may be utilized as covering forces in protection of the front or flanks of the battle position. During the conduct of a defense, cavalry may be employed on special missions or be held in reserve.

Infantry. Motorized infantry units may be employed in advance of the battle position as a covering force. Small infantry detachments may be placed in advance of the battle position to constitute the outpost. Within the battle position infantry units will be assigned sectors for defense or hold positions on the regimental reserve line. Infantry units which are not utilized on the battle position or in the covering forces are held in rear of the battle position as a mobile reserve.

Field artillery. The artillery is held "in readiness" or it supports the defense of the battle position by performing direct support missions for designated infantry units or general support missions for the force as a whole. No artillery is held in reserve. Artillery is placed in readiness when its best location cannot be definitely foreseen. In this case, some of the light artillery may be placed in a central location where the road net favors movement to the front or either flank; from this position it will be prepared to move on call to

occupy any one of several previously prepared positions as soon as the hostile threat has developed.

Position areas for artillery are so located that fire can be delivered well to the front and flanks to engage an approaching enemy force at long range. It will be emplaced to cover the front and flanks of the battle position with special reference to favorable corridors of approach. Firing data will be computed so that fire may be massed in specified areas, particularly in the protection of exposed flanks. Depth is provided by placement of battalions, some being placed sufficiently far to the rear to enable fire to be delivered in support of the regimental reserve line.

Coordination is obtained by prescribing lines which are to be reached by units and by prescribing the lateral limits of fire. Contingent missions may be assigned which permit artillery firing in support of a particular unit to switch its fire to assist artillery units on its flanks.

Combat engineers. Combat engineers are used to execute demolitions and construct obstacles to delay the hostile approach. They may be employed to lay out a battle position and construct certain of its works. During the conduct of the defense they may be assembled in reserve to be available for combat as required.

Other units. Defensive operations provide no special tasks for the remaining arms and the services. They continue to perform their usual functions.

Summary. The above discussion may be summarized as follows:

Defense doctrine. A defensive position is organized:

- (1) In depth,
To guard certain keypoints,
With only portions (tactical localities or defensive areas) of the position occupied,
with the intervals covered by fire alone.
- (2) So that the enemy:
Blocked in his front by tactical localities,
Is forced into intervals,
Where he is held by obstacles, and
Taken under further fire from the flanks.
- (3) With the result that the attacker,
Suffers heavy casualties,
Loses cohesion and control,
Is finally brought to a halt,
And is ejected by a counterattack.

Influence of terrain on the plan of defense. (1) A plan of defense of a sector is prepared after consideration of the following:

The mission
Width and depth of the sector
Strength of units
Supporting fires available
Analysis of terrain

(2) An analysis of terrain takes into consideration:

(a) *Terrain in general.* Corridors leading up to and into the position. Cover, concealment, fields of fire, observation, natural obstacles, routes of communication.

(b) *Influence on the defense.* Keypoints within the sector; the selection of weak parts and strong parts of the position.

(c) *Influence on the attack.* Terrain features within the defensive area the capture of which will further the enemy attack—the area through which the enemy will probably make his strongest attack.

Conduct of the Defense. The defense is conducted so as to:

- (1) Disorganize the attack in its preparatory stage.
- (2) Stop the attack by fire in front of the battle position.
- (3) Repulse the assault by close combat if the attack reaches the battle position.
- (4) If the enemy succeeds in entering the battle position to attempt first to subject him

to such an intense, coordinated fire of all available arms that he will be forced to withdraw; and this failing, to eject him by counterattack, so that the end of the battle will find the position entirely in the hands of the defender.

We say, therefore, that there might be three phases in the development of defensive combat, viz:

- (1) Defense against enemy preparations for attack of the battle position.
- (2) The exterior defense of the battle position.
- (3) The interior defense of the battle position.

The defense, to effect its purpose and to meet the different phases of defensive combat, provides for full and effective employment of coordinated fire power by all arms, and for movement as well, to meet developments in the defensive battle.

The system of fire consists of:

- (1) Long range artillery fire in localities well forward of the battle position.
- (2) The combined fire of artillery and infantry weapons in localities in front of the battle position.
- (3) The fire of infantry weapons alone in localities close to the battle position.
- (4) The combined fire of artillery and infantry weapons within the battle position.

WITHDRAWAL FROM ACTION

Purpose. A *withdrawal from action* is an operation by which all or part of a deployed force executes a breaking of contact with an enemy, particularly an enemy which is attacking or pressing an advantage, in order to initiate some other action. It is classified as a retrograde movement (movement away from an enemy), and as a defensive maneuver. The immediate purpose may be to rescue a command from a desperate situation, or to break off an engagement which has already accomplished its purpose or which appears to offer no further chance of success. It seeks to put space between the opposing forces. After contact has been broken the withdrawing force may execute a retirement, occupy a new position for defense, or execute delaying action in successive positions.

Classification as to Time of Execution. Withdrawals from action are classified as *night withdrawals* or *day withdrawals*, depending upon the time at which they are initiated.

A *night withdrawal* is the preferable method when the commander is free to choose. The movement may be concealed by darkness so that the force may be well started on its next maneuver under the protection of adequate covering and security forces before the enemy discovers the withdrawal. A force in withdrawal is particularly vulnerable until its next operation is well organized and started. The commander of a hard-pressed force will prefer to hold his positions until nightfall rather than risk the hazards of daylight withdrawal unless to do so will entail a very definite chance of decisive defeat.

A *daylight withdrawal* must usually be executed in the face of serious enemy pressure. An aggressive enemy upon discovering the rearward movement will seek to convert an orderly withdrawal into a rout, bending his every effort to block its execution. Cavalry, however, may employ this maneuver with greater safety than a force which includes a large infantry component, especially a cavalry force withdrawing before infantry. Their greater mobility will gain the space and time so badly needed for the clean breaking of contact.

Execution of a Night Withdrawal. Orders for a withdrawal from action at night must be issued sufficiently in advance of darkness to permit reconnaissance, planning, and issue of orders by subordinate commanders. Success of the maneuver may hinge upon secrecy. The arrival of daylight must find it completed and the next operation well under way. Speed may be achieved only by orderly movement and the maximum use of the best routes, with the avoidance of the mishaps which cause delay, confusion, or discovery.

A *covering shell* protects a night withdrawal. A small fraction of each unit in contact, such as units from infantry and artillery battalions, remains in position until an hour or two before daylight. These units accelerate their firing and activity in order to conceal the departure of the bulk of the force. Under the protection of this shell the bulk of the force

completes its withdrawal. A logical order of withdrawal is: service units and installations, artillery, infantry. At the designated time the units in the covering shell assemble, move quickly to prescribed assembly areas, and effect their own withdrawal aided, if practicable, by motor transport to overtake the main force. Dawn should find the position empty and contact completely severed.

Execution of a Daylight Withdrawal. Orders for a daylight withdrawal must be issued sufficiently in advance of the start of the maneuver to insure understanding and coordination within all units. Under hostile pressure, the sight of large units moving to the rear may induce others, whose duty is to remain, to start back unless they have been informed of the plan. Such movements when started are difficult to control. There is no military maneuver which requires a higher degree of discipline of all ranks, or greater capacity for leadership, than a daylight withdrawal executed under strong hostile pressure.

Protection is provided by covering forces which operate quite differently than the covering shell described above. In the one case stealth, concealment, and deception are relied upon. But for the other, speed of withdrawal combined with the power of covering forces to hold off pursuit must furnish the protection.

Service units and a portion of the artillery must clear the area before infantry units in contact can be withdrawn. At the proper time, upon order, these infantry units break contact by moving straight to the rear, fighting their way back if need be, under the protection of *local covering forces* placed in position by subordinate commanders for the protection of their own units. A situation which often develops, in practice, is that the most hotly pressed units must be the very last to break contact; for them to withdraw too soon may expose the entire force to envelopment, leading to destruction. During the withdrawal no unit may be permitted to expose the flank of another. The arrival of the shield of darkness is often necessary before the organization for the next operation can be completed.

General covering forces, designated by the force commander, are formed from the general infantry reserve with suitable attachments of artillery, and such special units as cavalry, tanks, chemical units, engineers, or antiaircraft artillery. They are formed from units which are available to the commander and are constituted so as to be able to cope with the requirements of the mission assigned. Unlike the covering shell which remains in place to cover a night withdrawal, these units are placed on commanding ground in the rear or on the flanks of the withdrawing units, not on their front, since under the circumstances of a daylight withdrawal under pressure such positions cannot be occupied. They prepare to block pursuit by fire action delivered particularly at hostile units which threaten the flanks. Long range artillery and infantry heavy weapons fires are employed. This fire action is to force the enemy to forego action against the main force and divert his attack to the general covering force or forces in order that the bulk of the command may move with minimum interference. The covering force may counterattack, defend on a single position, or execute delaying action in successive positions, whichever will be the most effective in accomplishing the mission.

Under the protection of the general covering force the ensuing action is started. If march columns are to be formed, as will often be the case following a successful breaking of contact during daylight, a rear guard and flank guards must be formed to provide close-in security.

Once contact has been severed the hostile advance must be impeded by all practicable means. In addition to the action of covering forces the use of demolitions to destroy bridges and roads, the placing of contact mines, and erection of obstacles will each be desirable. These are functions of combat engineers.

The very nature of the conditions inherent to a daylight withdrawal indicates that a commander free to choose will prefer to initiate the movement under the protection of darkness. But where the enemy attack is driving hard upon its objectives, and decisive defeat is a definite expectancy if the hostile advance cannot be blocked or evaded, the commander may be forced to accept the hazards of daylight withdrawal in order to preserve his command. It is a difficult decision. Its orderly execution requires time, careful planning, precise orders. If delayed too long the chance of withdrawal may become forfeit. In that event defeat may become the inevitable consequence.

DELAYING ACTION

Purpose. *Delaying action* is an operation executed in order to prevent the uninterrupted advance of a hostile force. It seeks to gain time without fighting decisive engagements. The extent of the delay which must be obtained is often definitely announced by prescribing that the enemy must be held beyond a definite line or terrain locality until a certain date and hour. The maneuver may be employed in order to prevent hostile troops from reaching the area of the main forces in contact; a commander may resort to delaying action on a portion of a front, in preference to defense of a single position, in order to mass a strong force within a restricted area to launch a decisive attack. Since a strong delaying action may be fought by weaker forces than are required for defense, the commander may elect to cede a minimum of territory so that stronger forces may be assembled in a decisive area.

The Factors of Time and Space. The factors of time and space, tyrannical considerations in all military operations, have special importance in delaying action. How much territory may be given up? How long must the enemy be prevented from reaching a definite position? The nature of the action is governed by answers to these questions and an analysis of the terrain. The conditions are infinite, but a study of time and space will enable reasonable conclusions to be reached.

Assume that a hostile force can be intercepted at a certain point, and that it is to be prevented from reaching a line in rear of the point until a definite day and hour. First, determine the time the enemy can reach the prohibited line if his advance is uninterrupted. This will give at once the extent of the delay which must be exacted. Having determined the factor of time, the commander will consider the space available to him through which he is free to maneuver, and the nature of the terrain on which he is to effect delay. If the space is short he may be forced to secure the total amount of delay from a single position, as one extreme, in which case his action is purely one of defense until the mission is accomplished. But if the space is deep he may utilize a number of delaying positions in order to obtain the delay which is required.

This analysis having been completed the commander will formulate his decision and plan. If the delay is to be accomplished in successive positions he will make tentative selections of terrain localities before the operation commences. He will wish to occupy strong terrain, which the enemy cannot avoid, with good observation and long fields of fire. Since he contemplates withdrawal from each delaying position, suitable routes of withdrawal will be factors in his choice.

Conduct of Delaying Action. The initial delaying position, at least, having been selected, the force will be moved into the position, formed for combat, and the organization of the position started. Delay in advance of the initial delaying position should be obtained in order to force the enemy to deploy and take action to discover the position. This, in itself, obtains time. It is executed by detachments, preferably those with fire power and mobility, which move forward and engage the enemy with long range fires. Further delay is obtained by harrassing action against the hostile flanks; this may be secured by motorized infantry with artillery support or by cavalry. As soon as the enemy comes within range of the troops on the delaying position he is engaged by fire. This should force him off roads, into deployed formations and assembly areas. The position may be held until he forms for attack, even until his attack is well started. Infantry will prefer to hold a delaying position until darkness, then execute a withdrawal from action and occupy a new position in which to obtain delay during the next day. Cavalry, however, is more free to execute daylight withdrawals.

Thus the action is continued. The hostile force must be impeded to obtain the required delay, or the maximum delay if no definite time limit is prescribed. The delaying force must avoid becoming decisively engaged for to do so may result in destruction with failure to accomplish the mission.

Small forces are able to delay large and strong ones. The frontage assigned units may be much larger than would be occupied in defense of a position. The time for starting a withdrawal must be closely controlled by the commander. The new position must be designated in advance and known to all. Reconnaissance for routes to the new position and positions

to be occupied by each unit should be reconnoitered prior to movement. The necessary arrangements for control and coordination having been made, the actual execution of the withdrawal is properly decentralized to subordinate commanders.

Hostile motor movements around the flanks are especially dangerous. Units with equal mobility which can move to block an envelopment are necessary. Demolitions may be employed to retard enemy movements by motor. Road blocks may be installed over a wide front to prevent hostile movements by motor at night. If the situation is obscure large reserves must be held to meet threats as they develop.

The commander of a delaying force must act promptly and surely in the execution of a mission with infinite possibilities. He must obtain information of enemy movements promptly in order to move to block them. Confronted, as he will be, by stronger forces, he must be alert to every opportunity to obtain delay and avoid every hazard as it develops.

RETIREMENT

Definition and Purpose. A *retirement* is a movement away from an enemy, a retrograde movement, in which a force seeks to regain freedom of action. Such a movement, to be a true retirement, must be part of a well-defined plan which has for its purpose the refusal of decisive combat in an area under the conditions which obtain at the time. The terms *retirement* and *retreat* are similar in meaning. A hostile retirement, for psychological reasons, may be referred to as a retreat. A logical distinction is that a force making a retreat is unable to retain freedom of action or choice, and the movement is conducted under such pressure that interruption of the movement may result in decisive defeat. A *rout* may develop after a decisive defeat or the failure to effect an orderly retirement. Units begin to disintegrate; control diminishes and may become non-existent. Panic may ensue. Lee retired after Gettysburg; Napoleon retreated from Moscow, but despite his losses one can hardly say that his force was routed; at Tannenberg many Russian units were routed. It is often a nice distinction. It should be clear that in a retirement the operation must be planned, control must be retained, security measures must be observed and maintained; the enemy must be prevented from regaining contact until the time and place have been reached where the commander is once again willing to resume contact under conditions of his own choice.

Conduct of a Retirement. A force in contact with an enemy will necessarily execute a withdrawal from action, in order to sever contact, before the retirement can be started. Once this contact has been broken and the force has moved beyond the zone of effective hostile artillery fire, road march formations may be taken.

The commander must prescribe a march objective and announce the route to be followed, the number of columns and their composition. He must provide continuous and adequate security measures to protect his command.

The security measures which are necessary will certainly include a rear guard; in the usual case a large force will require covering forces and flank guards. Covering forces, if employed, must intercept and delay hostile units which seek to strike the flanks or block the retirement by encircling action. They are especially necessary against hostile motorized or mechanized units.

Demolitions are useful in protecting a retirement. The destruction of bridges, culverts, road intersections, and rail facilities will delay pursuit. Obstacles erected on roads, especially those which include contact mines, should be employed; they are especially important in blocking hostile movements by motor at night.

The retirement must be conducted in such a manner that the enemy cannot regain contact, or seriously delay the operation, until an area is reached or conditions developed where the commander is again willing to make a stand under conditions of his own choice.

ANTIAIRCRAFT DEFENSE

Definition and Purpose. Ground troops are concerned with the execution of security measures to counteract the effects of hostile attack from the air to insure that they may carry out their primary ground missions. An understanding of these security measures

is especially important to the commander of medical units. Their hazards are essentially equal to those of other units which operate within the combat zone, and they are not provided with weapons with which to conduct a defense. Medical units must rely upon passive measures of protection or obtain protection from other troops.

The Threat. Bombardment aviation is the principal air threat to ground troops. These airplanes are able to deliver a maximum of 2400 rounds of machine-gun fire in 30 seconds. They carry fragmentation bombs which break into a large number of fragments upon detonation. Bombs loaded with liquid chemicals may be used.

Attacking airplanes are usually employed on a single mission in units of at least a squadron. They will seek remunerative targets such as troops in bivouac, in assembly areas, or on the march. These targets will often be located by the hostile observation aviation and reported to attack units; it is considered unwise for attack aviation to fly over a zone in search of suitable targets. They may approach their objectives at low altitudes, perhaps only a few feet above the ground, deliver their machine-gun attack from ranges of 1,000 yards or more, then fly over the target to drop their bombs. The speed of flight is so great that an attack by a single unit is a matter of a few seconds. The defensive action which is taken must be rapid to provide a hope of success.

Active Measures of Protection. Troops armed with weapons suitable for antiaircraft fire are trained to engage promptly hostile aircraft within range. Rifles, automatic rifles, and caliber .30 and caliber .50 machine guns are suitable for this purpose. With these weapons hostile airplanes within 2000 yards should suffer losses although it cannot be expected that such attacks can be prevented. Infantry and field artillery units are able to provide their own active measures of defense against low-flying hostile aircraft. The effectiveness of their fires depends upon adequate training and provisions for air alarms. Skill in antiaircraft firing can be developed by training. An important part of this training is the development of confidence in the minds of the soldiers so that fire will be delivered with the maximum degree of coolness. The volume of fire which can be delivered quickly by an infantry battalion is very great. It is reasonable to expect that attacks by low flying aircraft against troops trained in this class of firing can be made costly, perhaps so costly as to be unremunerative.

Antiaircraft artillery is assigned the mission of attacking hostile aircraft at high altitudes. It cannot be expected that this materiel will be available to protect more than the most vital installations and areas of largest troop assemblies. The characteristics of antiaircraft artillery are discussed in Chapter III.

Passive Measures of Protection. For the purpose of this discussion, passive measures of protection are classified under five headings: *concealment, cover, dispersion, security, and speed.*

Concealment is employed to avoid detection by hostile aircraft. Partial concealment reduces the chance of detection. The use of wooded areas, movement in darkness and poor visibility, camouflage, and deception by dummy installations are examples of concealment. This means of protection should always be employed for the protection of troops in bivouac, assembly areas, or other massed formations while halted.

Cover is sought to minimize the effect of air attack weapons. It is provided by the natural physical objects of terrain such as ground folds, ditches, and reverse slopes. Protective clothing for use in the presence of chemical agents is classed as cover. As soon as the air alarm sounds, ground troops seek suitable covered positions in which to await the approach of the attacking planes.

Dispersion is resorted to in order to avoid presenting a remunerative target. It facilitates concealment, cover, and security. Irregularity in formation and marching in multiple columns are examples of dispersion while in movement. The effectiveness of air attack is reduced by separating individuals and units so that compact targets are not presented.

Security includes the measures which are taken to give warning of the approach of attacking airplanes. This information is obtained and disseminated by all headquarters. The aircraft warning service installed in each theater of operations may provide informa-

tion in time to be of use. Close-in warning is provided by air lookouts. They are stationed on the front, flanks, and rear of a force to detect and give warning of the hostile approach.

Speed as a defense measure consists in completing operations in as short a space of time as possible in order to preclude the chance of planning and executing an air attack while the troops are in movement or exposed. The preparation and conduct of a march, entrucking and detrucking are especially vulnerable periods.

Friendly Pursuit Aviation. When it is available in sufficient quantities, the best protection of ground troops is afforded by friendly pursuit aviation. Its use may obtain air superiority so that hostile airplanes are denied an approach to the ground troops.

Protection of March Formations. The first step in the antiaircraft defense of a march is the adoption of a formation which promises the greatest cumulative protection by the application of active and passive measures and which is appropriate for the road net, terrain, and the logistics and tactics of the ground situation. A suitable formation which facilitates rapid deployment laterally and the delivery of defensive fires is the primary consideration. In order to enable troops to effect further quick dispersions from march formations, it is preferable to divide columns from front to rear, rather than a method whereby alternate units move laterally to opposite sides of the road. A formation which is rigidly applicable to all marching situations is not possible. The danger to marching troops from attack aviation is greatest when troops are forced by limited time, a poor road net, terrain preventing cross country movement, and tactical considerations, to make a daylight march in mass along well defined roads in normal route column formations. Marches under such adverse conditions should be protected by offensive air operations against the hostile aviation and by antiaircraft artillery. Machine-gun units should be attached, by platoon, to rifle companies and march by section when tactical requirements permit. It is highly desirable for motorized machine-gun sections to move by bounds from one selected position, 250 or more yards off the road, to another, with priority on roads where necessary. Machine guns in such positions generally will be outside the effective zone of the air attack. Against an enemy using gas, this machine-gun fire will constitute a very important defensive measure. A formation which may be feasible in many cases is a single file of foot troops on each side of the road, with vehicles which must accompany the foot troops moving by bounds between and following the files of foot troops.

Action When Attacked on the March. When the air attack alarm is sounded, or an actual attack is launched, all men with shoulder weapons, and other individuals not otherwise engaged, rapidly deploy off the road, seek what cover is immediately available, and open fire on the attacking planes. Ditches, gullies, small depressions, trees, and walls offer some cover from bomb fragments and grazing machine-gun fire. The fire of the suitable weapons in the rifle units, supported by the fire of the motorized machine-gun units from positions outside the effective attack zone, directed accurately toward low-flying planes, even for the few seconds of time available, may be expected to inflict losses on hostile planes and pilots. If animal-drawn units are present, the animals are moved off the road and tied to trees, fences, or telegraph poles, if the time permits. In many cases the animals will have to be held on or near the road. In all cases every effort must be made to prevent runaway animals, with the resultant confusion and injuries. The best time for riflemen to get in a few shots at the hostile planes is between the passage of the machine-gun fire and the detonation of the bombs. When bombs are released, all men within their effective radius of burst cease firing and quickly lie prone under whatever cover is available. After the bombs dropped in the close vicinity of a unit have detonated, preparation is made to fire at the planes in case they circle, or to fire at any succeeding elements in the air attack. All commanders down to include squad leaders exercise such supervision as may be practicable in the time available. If the enemy has initiated the use of chemicals, marching troops put on their gas masks at the first warning of air attack, and immediately follow with the action as outlined above. Thereafter the troops are promptly moved out of the gassed area and given such first aid measures as may be directed.

Night Marches. Night marches are usually less exposed to observation and attack

from the air than by day. Passive measures alone can be taken by troops when they cannot see to fire on the enemy's planes. Even at night, marching troops should never remain standing at the halt for any length of time. When attacked at night, marching troops move off the sides of the road and throw themselves flat on the ground. When flares or other sources of illumination make hostile planes visible, all troops within range open fire unless concealment is more important than fire, in which case troops refrain from looking upward.

Movements by Motors. This discussion includes the movement of motorized trains as well as troop movements by motor. Entrucked troops base their own protection against low-flying aircraft principally on passive measures. As meager a target as possible is presented for as short a time as possible. Nevertheless, the maximum fire is directed



Plate 11. Air Attack on Ground Troops.

at attacking planes, although circumstances often greatly lower the efficiency of such fire, and sometimes preclude it. To prevent riflemen from shooting each other in a lurching truck, only men whose weapons can be supported (used with a rest) are designated to fire. It is not practicable to mount machine guns on all trucks carrying troops. Motorized machine-gun sections (infantry or antiaircraft artillery) may be distributed throughout an entrucked troop column. Generally, by day, vehicles of small columns move individually at varying distances up to several hundred yards and at the fastest practicable speed. Massing of troops and transportation and the closing up of trucks in one column are kept to the minimum at entrucking and detrucking areas, and during such activities an area machine-gun defense should be established. An area defense is also desirable to protect traffic jams. Every effort must be made to avoid traffic jams, or the closing up of trucks when halted. Motorization of infantry units is relatively new in our army. With this limited experience, opinion as to the conduct of entrucked infantry when attacked from the air has not crystallized. There are some who believe that entrucked infantry on good roads in daylight should engage attacking planes in a running fire fight. The obvious objections to this are that the attack aviation has the advantage in both speed and fire power, and accidents to disabled trucks introduce added danger. Others maintain that trucks should halt on or off the road when attacked from the air, and that the occupants should jump out and take cover if time is available, otherwise they should remain in the

trucks. When attacked at night, such attacks usually being in the nature of harassment by single planes, the greatest protection may be secured by keeping in motion, particularly on dark nights or on roads that are not well defined to air observation.

Defense of Bivouac Areas. *General.* Troops in bivouac rely principally upon passive measures for their protection against air attack. If well dispersed over the terrain with good cover and concealment, bivouacked troops do not offer a very remunerative target to combat aviation. In open terrain with little or no facilities for natural cover and concealment, the plan for anti-aircraft defense must be based upon defensive fires, dispersion consistent with effective fire defense, and the construction of shallow trenches and fox holes for protection against air attack weapons. There are several historical examples where deceptive concealment such as false lighting and false camp sites have been of value.

Selection of bivouac areas. The anti-aircraft defense of a bivouac area begins with the selection of that area. On terrain which affords ample concealment, cover, and area for dispersion, fire defense is secondary in importance. Troops should not be bivouacked too close to landmarks, such as prominent hills or the junction of roads and streams. Attacking planes may use such landmarks for orientation; hence the route of attack may follow the general direction of these terrain features. In general, however, with modern aides to air navigation available in the plane itself, the route of approach of an air attack may not be limited to any particular direction. In some situations, an air attack may be



Plate 12. Protection Afforded by Fox Holes.

Individual fox holes, trenches or small depressions afford protection against the flat trajectory of the fragments of bombs, and machine-gun fire.

launched from under cover of suitable terrain features or the early or late sun, and certain directions may appear more likely than others. Probable avenues of approach should be taken into consideration in assigning bivouac areas to subordinate units and in the establishment of the fire defense.

Passive defense measures. It is generally necessary to resort to camouflage to supplement the amount of natural concealment available. The importance of camouflage and other passive measures increases with the time an area is to be occupied. Every precaution should be taken to avoid discovery. Movement within the area should be kept to a minimum, and roads and trails avoided by day. Existing roads and trails should be travelled at night in preference to forming new ones. New trails formed during the night should be camouflaged by daylight. Troops discovered moving into a bivouac area or attacked while in bivouac, should move to a new area, when practicable, as soon as the move can be made secretly. In locations liable to be attacked by aviation, troops should not bivouac in the same area for extended periods of time. The best use should be made of natural protective cover which serves as protection against air attack weapons. A considerable dispersion of units, and elements and individuals within units in bivouac, is always desirable, even where ample concealment is available. Air lookouts and air observers should be posted so as to detect the approach of hostile aircraft from all directions, and to transmit warnings, particularly to machine-gun fire units. Troops should not halt or countermarch during the occupation of the area, and should not be formed unnecessarily early when moving out.

Defensive fires. Provision should be made so that elements of an infantry unit are capable of mutually supporting defensive fires. This applies particularly to the establishment of a ring of mutually supporting machine-gun units, usually platoons, around the bivouac area so that enemy planes approaching from any direction are met by an effective volume of fire before they arrive within bomb or gas spraying range of the defended area. One or more machine-gun units should be emplaced within the bivouac area as a precau-

tion against possible diving attacks and to fire at planes which cross the fire zone of the outside ring. When enough machine guns are available, best results will be obtained by emplacing machine guns in platoon units. This will generally be practicable when an infantry regiment is part of a larger force, the normal case, and part of the periphery

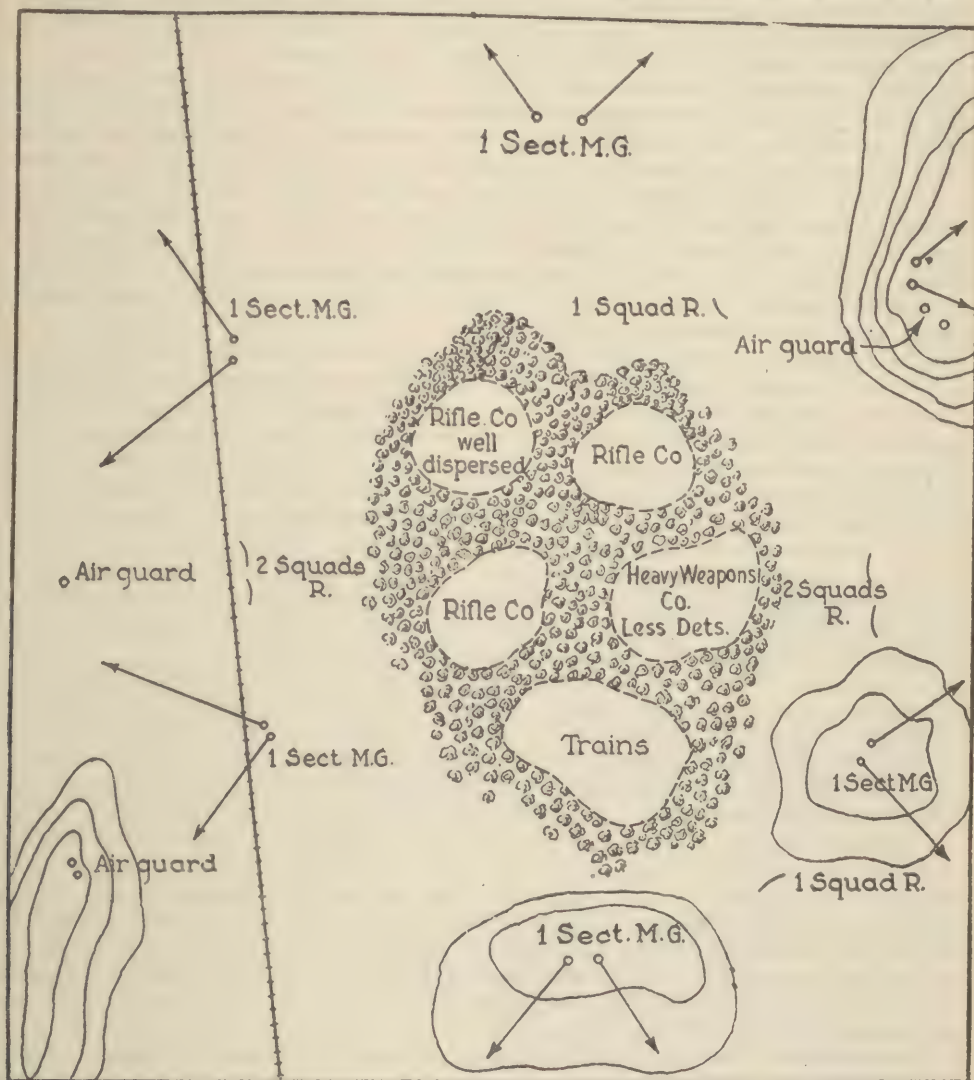


Plate 13. Infantry Battalion in Bivouac with Area Defense Against Air Attack.

around the regimental area is covered by the fire of adjacent units. In other situations it may be necessary to dispose the machine guns by sections. To be mutually supporting, and to give a uniformly effective fire power around the defended area, the machine-gun units should not be more than 1,000 yards apart, and emplaced so that their all-around fire is not masked by obstacles. All weapons suitable for anti-aircraft fire should be kept loaded and at hand. *Units without weapons for defending themselves should be bivouacked so as to receive incidental protection from the fires of other units.*

Antiaircraft Defense in Combat. Defense of assembly areas. Assembly areas are generally occupied for a shorter time than bivouac areas. The tactical situation may

limit the degree to which passive antiaircraft defensive measures can be applied. The time element usually limits the degree of organization of the antiaircraft defense. Within these limits, the defense of troops in assembly areas against enemy aircraft is similar to the defense of bivouac areas. One point usually requiring consideration is the relative merit of fire or concealment as the most appropriate counter-measure against hostile observation aviation. If assembly areas are attacked with effective concentrations of persistent gas, the troops must move without delay to new areas.

General comments. Units deployed for combat, especially entrenched troops, ordinarily offer a comparatively unremunerative target to combat aviation. Nevertheless, troops must be prepared to meet air attacks during the progress of a ground battle. Ordinarily, troops engaged with the enemy on the ground take cover from an air attack and direct the fire of all suitable weapons against hostile aircraft. The short time that fire is directed at hostile planes will usually have no appreciable effect upon the ground situation. In some cases, it may be necessary to designate certain weapons for antiaircraft fire. Troops should not fire on enemy planes not attacking them when such fire is less important than secrecy. An extensive use of air guards is impracticable for troops actually engaged with the enemy on the ground.

In the defense. Troops in the forward part of a battle position will offer a poor target to the enemy's combat aviation because of their concealment, cover afforded by entrenched positions, and dispersion. Troops on the forward position should never fire on enemy planes not attacking them, if such fire would disclose their positions. Units whose positions have undoubtedly been discovered should fire on all enemy planes within range. The commander of a battalion sector is the lowest commander to authorize such fire. When so authorized, the opening of antiaircraft fire then becomes the responsibility of local commanders of small units. Reserves in defense will ordinarily be more vulnerable to air attack for the following reasons: they are usually held more concentrated; they are vulnerable during movement to places of employment; and they may not have the cover afforded by entrenched positions. Therefore, reserve units should make the utmost use of all practicable passive measures and defensive fire.

In the attack. Troops advancing the attack take cover and direct the fire of all available weapons against attacking planes. Troops in the attack ordinarily fire at all types of hostile planes within range, as the progressive antiaircraft fire by small units will be drowned out by the general firing in the ground engagement. Because of irregularities of terrain, extended troop deployment, and difficulties of control, effective action against hostile aviation is usually the responsibility of small unit commanders.

Antiaircraft Defense of Trains. *Passive measures.* There is no reason, in most situations, for unit trains to move during the day. Trains must ordinarily depend upon such passive measures as are practicable, with incidental protection from fires of other nearby combat elements. Trains depend upon concealment, dispersion, and fires, in the order named, for protection against enemy aircraft. Concealment is secured by the use of overhead cover such as trees and buildings, by camouflage, and by absence of movement during good visibility. Dispersion should be sufficient to result in offering only unremunerative targets to enemy aircraft.

Defensive fires. Defensive fires for the trains may be furnished: by organized antiaircraft troops; by attached infantry troops; by weapons organically a part of the trains; incidentally by fire from units having other missions at the time. The first method is the most effective when available, however, the movement of trains cannot be made with impunity when such a defense is set up. The second, though effective, is objectionable when it results in the diversion of fire power from the accomplishment of the primary combat mission. The number of organic weapons in infantry trains is not sufficient to provide an adequate fire defense, therefore negative measures must be relied upon. Incidental fire defense by troops engaged with enemy ground forces is uncertain.

ANTIMECHANIZED DEFENSE

Importance. It has been definitely established that tanks and other mechanized fighting vehicles constitute a serious threat on the battlefield as long as they can operate under favoring conditions of weather and terrain. These vehicles have definite limitations.

They are sensitive to steep slopes, to marshes, to rivers and streams, to forests with large trees. But in open country their speed and power present a threat to all but the strongest defensive measures. See Chapter III.

Commanders of all forces must be alert to the possibility of mechanized attacks and raids. Their positions will be selected to reduce this hazard to the greatest degree attainable. They will seek natural obstacles to guard their front, flanks, and rear. Time permitting, they will increase the difficulty of tank operation by improvement of natural obstacles, by the use of barbed wire, by mine fields and other measures. Those areas which cannot be fully protected by such obstacles must be protected by the fire of anti-mechanized weapons. The speed with which such attacks are made requires that defense arrangements be made in advance and constantly maintained.

The means available for antimechanized defense are active and passive. The active means include antitank guns, artillery, attack aviation, armored vehicles, mines, and, in emergency, any firearms and explosives in the hands of the troops attacked. The passive means include natural barriers; road blocks; wire rolls; demolitions, and other artificial obstacles; buildings; and organized localities. Usually, active and passive means are used in combination. *A barrier or obstacle loses its defensive value unless protected by fire.* An extensive use of passive means on less critical fronts permits an economy of active means in order to concentrate the bulk at the decisive place.

Means Other Than Weapons.

Natural obstacles. Whenever and wherever possible the enemy should be denied favorable routes of approach, or his advance should be materially impeded by maximum use of some or any of the following natural obstacles: unfordable water, marshes, thick woods with large or strong trees, large boulders closely strewn, tree stumps that may belly a tank, deep steep-sloped gullies, precipitous slopes, and deep mud.

Artificial obstacles. For the reasons just stated, the maximum use should be made of any or all of the following artificial obstacles: antitank trenches, large shell craters, canals, walls, tank barriers, tank traps, and mine fields. It is essential to remember that obstacles, either natural or artificial, must be so located with reference to the defensive position that they can be effectively covered by small arms fire.

(1) *Antitank trench.* If trenches are to be specially constructed or adapted for blocking tanks, the type of tank against which they are to form a protection must be considered. Antitank trenches should preferably have steep walls, a width somewhat greater than half the length of the tank they are intended to stop, and a sufficient depth. Plate 17 shows two suitable types of antitank trenches.

(2) *Antitank mines.* Antitank mines are usually of the contact type. They are buried in the ground or scattered on its surface. To be reasonably effective, mines must be placed where enemy tanks can be expected to operate. The ends of underpasses, bridges, culverts, road defiles, fords, and defiladed ravines are semi-obligatory passages. In addition many other areas such as clumps of light woods and ground depressions will be indicated to the eye of anyone familiar with tank methods.

Mine fields should be combined with obstacles so that in avoiding the obstacles, tanks will run over the mines. (See Plate 18.) To prevent the enemy from locating and destroying or avoiding the mines they must be carefully camouflaged from both ground and air observation. Edges of woods, wire entanglements, and shell-torn areas make good places to conceal mines from aerial photography. To form a real barrier, mines are usually laid checkerboard fashion in two or three rows, with mines and rows of mines from 3 feet to 6 feet apart. Oftentimes it is impossible to assemble and plant such a quantity of mines, and an inferior mine field has to be accepted. The more fuses there are, the more effective the mine field. Extensions of fuses are often made. To give a broader danger area, camouflaged timbers may be laid between fuses. A mine containing 5 pounds of TNT will stop a light or medium tank upon direct contact.

Within a position, it is often possible to do more with mines than can be done in front of it or on its flanks.

Finally, the location of mines must be known to all of our own troops—particularly those operating any sort of vehicles. All mines must be recovered when our troops advance.

Also, warning signs should be taken up from mine fields within the position, if a withdrawal is made.

Agencies other than infantry assisting in antitank defense.

(1) *Divisional artillery* may provide gun fire by either indirect laying with concentrations on tank bivouacs, assault positions, areas through which tanks must pass to reach their objectives, and assembly points, or else by direct laying with the individual pieces used as antitank guns.

(2) *Engineers* may prepare demolitions, assist in the preparation of barriers and obstacles or furnish material therefor, and provide antitank mines.

(3) *Observation aviation, mechanized cavalry, and all other reconnaissance agencies* are means that may be used to obtain information of hostile mechanized movements. Attack aviation may intervene in emergencies to disrupt the hostile operation.

(4) At times, *chemical troops* may assist by the use of smoke or gas. (Gases are used only in reply to an enemy who initiates their use.)

(5) Because they are essentially instruments of the attack, *our own tanks* are not well adapted to assist in the defense except where they can be employed aggressively, as in counterattack. Should our counterattack be of such size as to warrant the use of tanks, they may be of great assistance in expelling the enemy. They may operate effectively against foot troops following hostile tanks, or, under certain conditions, such as when our antitank defensive means are inadequate, they may operate with success against the hostile tanks themselves. Favorable opportunities for the latter would occur when hostile tanks have broken through our front line but have not yet reached their objective, or have become disorganized.

(6) With all due credit to the value of these arms in providing antimechanized protection, much of the close-in defense of infantry against armored vehicles must be provided principally by *infantry itself*. The weapons found within the infantry regiment are its primary means for this defense.

Weapons and Means Within the Infantry Regiment. The infantry's *small arms and machine guns*, when loaded with armor piercing ammunition, are effective weapons with which to attack mechanized vehicles. The penetrative capability of caliber .30 armor-piercing ammunition is not only of consequence against lightly armored mechanized vehicles but its bullet splash through cracks and vision slits is effective against more heavily armored mechanized vehicles.

Present *caliber 50 machine guns*, with their armor-piercing ammunition, are effective against all but heavily armored tanks.

Our *37-mm antitank gun* is a powerful and effective weapon. It is low silhouetted, easily manipulated, and is capable of disabling any modern tank except very heavily armored tanks, with one hit.

Other expedients that have been used with minor success in the past are: *grenades* tied together and thrown at a tank track or under a tank; any sort of destructive means like a *rifle barrel or crowbar* run through a track mechanism to throw it or break it; *gasoline* or *petroleum* thrown in glass containers against tanks and ignited by incendiary bombs or grenades; *brush or dry grass or grain set afire* in order to drive out or destroy attacking vehicles. Such means, however, are crude makeshifts, well worth knowing and using in emergencies but not to be considered in planning organized defense measures. They are last resort measures to be used by troops lacking more effective means.

STANDING OPERATING PROCEDURES

Purpose and Importance. Standing operating procedures consist of methods of performing many recurring phases of troop movement or employment so as to reduce normal operations to routine. These methods are built up through practice and experience. Between large units such as the infantry division a considerable degree of variation is to be

expected. Upon joining an organization, especially one which has performed extensive field operations as a unit, prompt inquiry should be made as to the exact nature of any standing procedures which are in use.

The advantage of the method lies in the increased simplicity and brevity of orders which must be issued for activities which recur frequently. Smoothness and efficiency of execution are increased. Time is saved and confusion may be avoided or reduced. Procedures can be built up and used with confidence in those large units which work together during an extended period without important or frequent changes of personnel. Their use has the additional advantage that they serve as a test of new methods which, after thorough proving, may find their way into training manuals issued by the War Department for the use of all. There is present the possibility that the good idea may be carried too far. They can succeed only when all commanders understand exactly what is required of them and of their units by each standing procedure because detailed instructions are omitted from routine orders. Changes occurring among the senior commanders, staff officers, or large personnel changes among the subordinate commanders present an immediate need for instruction, coordination, and practice. It can be overdone. Standing operating procedures should be regarded as tools to be used and exploited when conditions favor their employment and rejected when they may not apply.

The medical officer on duty with a force, such as an infantry division, must adjust and adapt the operations of his unit to the procedures of other organizations and the force as a whole. He must inform himself of the exact nature of the special procedures which are in use. He must provide instruction and practice for his own unit to enable it to function smoothly and confidently in accordance with these adopted procedures. Recognizing the limitations of the system, he may be able to develop worthwhile methods for a few of the recurring tasks which pertain solely to his own organization. Medical units are an integral part of the tactical structure. They must be able and ready to function as a part of a combat team in the same manner as all other units.

The Combat Team. Increasing use is being made of combat teams of relatively fixed composition. Basically, a combat team consists of an infantry regiment and a field artillery gun battalion which is habitually teamed with the same infantry regiment. Commanders of medical units should anticipate that certain units of the division medical battalion (or regiment), such as the collecting platoons, may be incorporated into combat teams. When this is done greater coordination is developed because commanders of all components become acquainted with one another, learn to work with one another, and gain a greater understanding of joint problems. Combat teams are designated by the number of the infantry regiment; hence, a combat team including the 1st Infantry would be designated as Combat Team No. 1. In many instances orders would issue to the combat teams as units, and the commander would not issue separate instructions to the components of the teams.

The March Group. A march group is a column consisting of a combat team, with attached units if any. It is commanded by the infantry regimental commander.

Standing Operating Procedures for Movement. Within the division, the commander may prescribe the components of each march group which will include the several units or detachments which constitute the force. Command of the march group passes to the infantry regimental commander when the movement is ordered and continues until march conditions cease or other orders are received. In the usual case the division commander warns the units sufficiently in advance of the contemplated movement to permit the necessary preparations to be made.

As soon as practicable or desired after the warning, the division commander orders the movement, except possibly the time of starting. Representatives of units and detachments report to the commander of the march group to which assigned as early as possible after receipt of orders for the movement, with information of positions of units or detachments, and time when they will be ready to move. The representatives then return to their units with instructions from the march group commander. When the march group is ready to start, or the time of readiness is known definitely, the march group commander reports to the division commander "March Group (No.) ready at

(hour)." As soon as the march groups have reported ready, the division commander orders the time of starting.

Ordinarily it is practicable and desirable to form the march group as it moves and without assembling it beforehand. This saves time and may avoid unnecessary marching. Elements of the march groups remain in their initial positions, such as bivouac areas, as long as practicable in order to rest the troops and perfect preparations.

A march group includes foot troops and motor vehicles loaded with personnel, equipment, and supplies. In the movement, motor vehicles move by bounds of the greatest practicable length. March group commanders report to division headquarters the position of the head of their respective groups excluding the security detachment as of the hour. The position is defined by the distance in miles from the initial point. For example: "March Group 2—10."

Unless tactical conditions dictate otherwise, it is particularly important that the time length and road space of motor columns be reduced to the minimum. In executing motor movements the leading vehicle moves at the prescribed speed, so far as practicable, but never exceeds it. Every vehicle of the column is kept closed on the vehicle ahead to the limit of safety, but this distance is not fixed in yards; rather, it is based on safety and the judgment of the driver himself as a result of training, experience, and supervision. In halting, the leading vehicle halts at the proper time; others close on it to two yards, tactical conditions permitting.

Standing Operating Procedures for Development for Combat. The division may be assembled preparatory for combat, the units moving into assembly areas, or it may be committed to action directly from march columns.

When the division is to assemble, on call of the division commander, guides from the march groups go ahead to the assembly area or other designated point, where assembly areas are assigned by the division commander. The march groups follow—without halting if possible—and are met by the guides and conducted to the assembly area. Every effort should be made to clear the roads for units in rear. A plan of traffic circulation is devised and traffic guides posted. Until otherwise prescribed by the commander, march groups remain intact during assembly. Communication between division headquarters and major units is established at once.

Standing Operating Procedures Appropriate for Medical Units. On the march a collecting platoon may be attached to each march group for march collection.

In combat, unit commanders of regiments, battalions, and similar units are responsible for the initial treatment, collection, and evacuation of the casualties of their units to unit aid stations. The medical battalion (or regiment) is responsible for gaining and maintaining contact with the aid stations and evacuating their casualties. Collecting platoons, usually one in support of each combat team engaged, establish their normal installations. In moving situations, the collecting platoon commanders establish and advance the collecting platoons on their own initiative (unless otherwise prescribed), reporting promptly their locations to the division surgeon. Reinforcing units are requested from corps when necessary. The command post of the medical battalion (or regiment) is usually established at the site of the clearing station.

CHAPTER VI

COMMAND AND STAFF PROCEDURE

The staff which serves the troops best, serves the commander best.

Medical officers are assigned in large numbers to duty with tactical organizations, such as medical battalions or regiments, and as attached medical personnel with units of the arms, such as the infantry regiment. In the execution of these tasks they may serve as commanders or staff officers of medical units, or as a staff officer, in addition to other duties, of a unit such as the infantry regiment or division. The duty involved in either capacity requires the medical officer to function in accordance with the principles evolved for the control of military units in command and staff procedure.

Command Responsibility. The commander alone is responsible to his superior for all that his unit does or fails to do. He cannot shift this responsibility to his staff or to subordinate commanders.

All orders from a higher to a subordinate unit are issued by the commander of the higher unit to the commander of the subordinate unit. If it is impracticable to comply with the orders received, due to an emergency or a change in the situation, the subordinate commander should so report to his superior. If it is impracticable to report, the subordinate commander should act according to his judgment and the policy of the commander, and report at the earliest practicable time the action so taken.

In order to expedite the execution of orders and to promote teamwork between units, a commander may authorize his staff officers to communicate directly with the staff officers of other units as to the details of orders issued or received. Interstaff communication, when used, should be arranged preferably by the commanders concerned.

Definition and General Functions of the Staff. The staff of a unit consists of the officers who assist the commander in his exercise of command. (See Plate 1.)

The staff secures and furnishes such information as may be required by the commander, prepares the details of his plan, translates his decision and plan into orders, and causes such orders to be transmitted to the troops. It brings to the commander's attention matters which require his action or about which he should be informed, makes a continuous study of the situation, and prepares tentative plans for possible future contingencies for the consideration of the commander. Within the scope of its authority, it supervises the execution of plans and orders and takes such other action as is necessary to carry out the commander's intentions.

The staff officer should have a thorough knowledge of the policies of his commander and should be acquainted with subordinate commanders and their units. A staff officer should be an active, well-informed assistant to the commander and a helpful adviser to subordinate commanders.

Classification of Staff Officers. The staff of a division or larger unit may be subdivided into two main groupings:

A general staff group organized so as to include all functions of command and composed of officers of the General Staff Corps and officers detailed as their assistants.

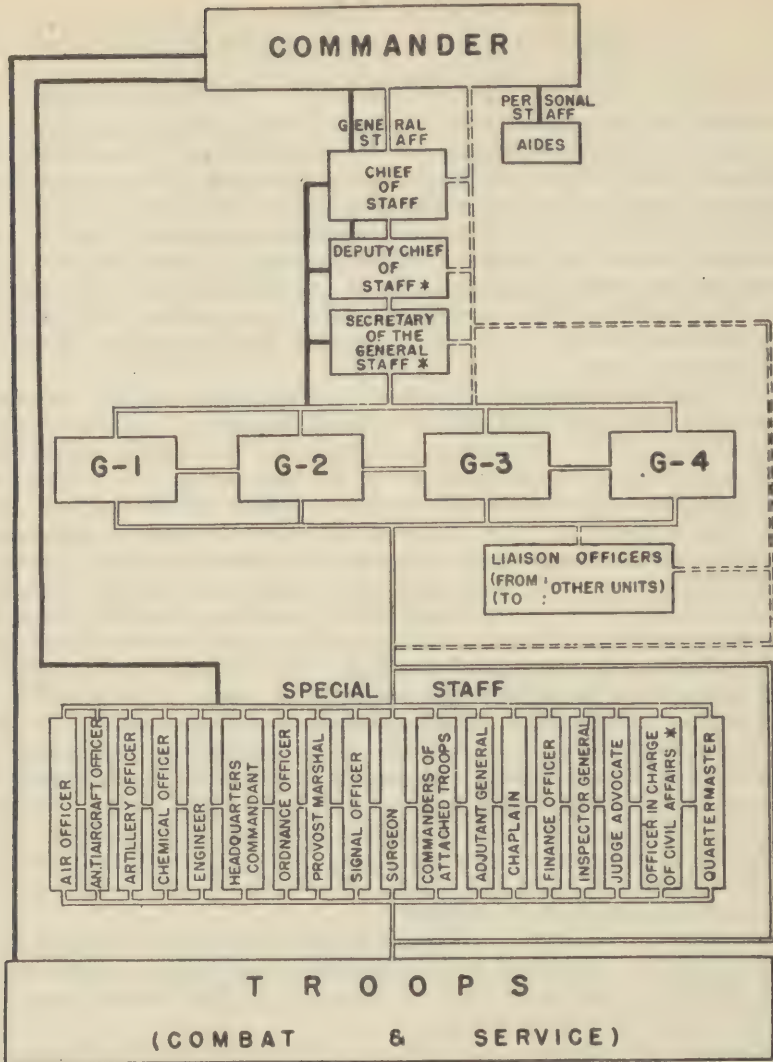
A special staff group, consisting of all staff officers assigned, attached, or who have duties at the headquarters and are not included in the general staff group. It includes certain technical specialists and heads of service.

In units smaller than a division, the same officer frequently performs duties of both general and special staff nature; consequently there can be no definite subdivision of such staffs into general and special staff groups.

Personal staffs or aides as authorized by law for certain general officers perform the duties prescribed by the general officer to whom assigned. They may be assigned to additional duties with the unit staff. They may be directed to keep the chief of staff or executive informed of the commander's whereabouts and of the general content of any oral instructions he may have issued during an absence from the command post.

Liaison officers.

Organization. Basis. The organization of a staff is based upon the duties of the commander. The general distribution of personnel to staff sections is shown in Tables



* IN CERTAIN UNITS
WHEN NOT REPRESENTED
ON SPECIAL STAFF.

— COMMAND CHANNEL (DOWN)
 === ROUTINE CHANNEL FOR—
 ADVICE AND RECOMMENDATIONS (UP)
 COORDINATION (DOWN)
 COOPERATION
 INFORMATION
 == OCCASIONAL CHANNEL FOR ADVICE AND
 RECOMMENDATION (UP)
 INFORMATION

Plate 1. Command and Staff Procedure.

of Organization. The detailed allotment of personnel to sections, particularly in the general staff group, will be made by the commander.

(1) The duties of all commanders can be divided into four principal functional groups as follows:

- Personnel.
- Military intelligence.
- Operations and training.
- Supply and evacuation.

(2) These 4 subdivisions of command duties, under a coordinating head, exist in the staffs of all units. In the staffs of the smaller units of certain arms or services the duties of two or more of these subdivisions may be performed by one staff officer. The coordinating head is the chief of staff in the division and higher units (executive in brigades and smaller units). He is responsible directly to the commander.

Division into two echelons. For convenience of operation it is necessary frequently to divide the staff into two echelons. The *forward echelon* consists of the elements required immediately by the commander for tactical operations; and the *rear echelon*, of the remainder of the staff required for administrative activities.

The composition of the forward and rear echelon of various headquarters is contained in the discussion herein of the *general staff* and *special staff*. In addition to the designated general and special staff officers, liaison officers from other units and the commander's personal staff (aides) may be with the forward echelon.

Cooperation. Teamwork is essential within and between staffs and between staff and troops. It is assured by cooperation and collaboration within and between all sections of the general and special staff groups, between the staff and troops, and between the staffs of subordinate, higher, and adjacent units. Prompt dissemination of essential information and of decisions and orders within and between groups is vital to the efficient functioning of a command.

The general staff group should consult the special staff officers as to the ability of their respective arms and services to execute contemplated missions, and give the special staff timely warning of operations in order to permit preparations.

Conferences of the staff including available subordinate commanders are often helpful. At other times individual personal contact is a more effective and practical procedure.

Authority. A staff officer as such has no authority to command. All policies, decisions, and plans whether originating with the commander or with the staff must be authorized by the commander before they are put into effect. When a staff officer by virtue of delegated authority issues an order in the name of the commander, responsibility remains with the commander even though he may not know of the order.

The dual functions of certain officers who are unit commanders as well as special staff officers are presented herein.

A Guide for Staff Officers. A new commander is apt to assume that everything is running smoothly and satisfactorily if too many complaints and appeals from decisions of his headquarters do not crop up. Having confidence in his staff, he is prone to let these officers decide for themselves what matters should be brought to his attention. Such a hit-or-miss system may result in a staff-run organization or in the commander being swamped under a mass of trifling details which his staff should handle.

The memorandum¹ which is reproduced below was placed in effect by Major General Frank S. Cocheu with a view to exercising command without infringing on any of the duties and prerogatives of staff officers, and is said by him to be the product of many years of experience.

MEMORANDUM: For the Staff.

1. The following will be brought without delay to the attention of the Commanding General:

a. Subjects of importance which require prompt action and are not covered by existing policies and instructions.

b. Disapprovals from higher authority.

c. Errors, deficiencies or irregularities alleged by higher authority.

d. Communications that allege neglect or dereliction on the part of commissioned personnel.

e. Correspondence or proposed correspondence conveying even a suggestion of censure.

f. Appeals from subordinates from decisions made at this headquarters.

g. Subjects which affect the good name or reputation of an officer or organization.

h. Subjects involving financial or property irregularities.

i. Serious accidents involving personnel of the command.

¹ Reproduced with permission of Major General Frank S. Cocheu, U. S. A., Retired.

2. The following will be presented to the Commanding General for final action:

- a. Requests and recommendations to be made to higher authority.
- b. Suggested disapprovals.
- c. Communications that contain a suspicion of censure.
- d. Communications that involve the good name of an officer or organization.
- e. Reports of financial and property irregularities.
- f. Letters to civil authorities in high positions.
- g. Endorsements on efficiency reports.
- h. Correspondence concerning war plans.
- i. Communications of exceptional information.

3. A copy of these instructions will be kept exposed at all times upon the desk of each staff officer of this headquarters.

Liaison. A staff officer should visit subordinate units to acquaint them with conditions which cannot be explained in orders, and to obtain information for the use of the commander and his own staff section. The procedure for officers on liaison missions should be followed.

THE GENERAL STAFF

Duties. The general statutory duties of the general staff with troops are to render professional aid and assistance to the general officers over them; to act as their agents in harmonizing the plans, duties, and operations of the various organizations and services under their jurisdiction; to prepare detailed instructions for the execution of the plans of the commanding general; and to supervise the execution of such instructions.

This subdivision of activities is intended only as a guide in assigning duties to the general staff sections. The unit commander may and should make such adjustment of duties as best meets operating conditions.

The general staff group is responsible for preparing and issuing all combat orders except those orders issued by the commander in person.

The general staff group supervises the execution of orders to insure understanding and execution in conformity with the commander's will.

Organization; Designation. *Divisions and higher units.* The general staff group of divisions and higher units is organized in 4 sections corresponding to the functional subdivisions of command. The group includes the necessary coordinating personnel. The chiefs of sections are designated as assistant chiefs of staff, G-1, G-2, G-3, and G-4. The organization includes:

- Coordinating personnel—chief of staff, assisted by—
 - Deputy chief of staff (in army and higher units).
 - Secretary of the general staff (in army and higher units).

Staff sections.

- Personnel section (G-1).
- Military intelligence section (G-2).
- Operations and training section (G-3).
- Supply and evacuation section (G-4).

In some divisions the general staff group consists of the chief of staff and three sections. The chiefs of sections are designated as assistant chiefs of staff, G-2, G-3, and G-4.

Units smaller than division. In units smaller than the division, to include the battalion (or equivalent unit), duties corresponding to those of the general staff group are assigned to officers listed below. Staffs of many smaller units are of such limited size that one staff officer is charged with the duties of two or more staff sections.

- (1) Chief of staff—the executive officer.
- (2) Personnel section—the adjutant (S-1).
- (3) Military intelligence section—the intelligence officer (S-2).

(4) Operations and training section—the plans and training officer (S-3).

(5) Supply and evacuation section—the supply officer (S-4).

Forward and rear echelons. The forward echelon of the headquarters of a unit usually includes all of the officers whose duties are of general staff nature. Representatives of G-1 (S-1) and G-4 (S-4) may be at the rear echelon.

Flexibility of Operation. Although the general staff group is organized into 4 sections there is much overlapping of duties; coordination and prompt interchange of information between sections are essential. In addition, general staff officers may be required to assist, or to take over temporarily, one or more other sections. This condition frequently exists in divisions and corps, especially when the headquarters of these units are operating on a 24-hour basis. It is of vital importance in smaller units.

Chief of Staff (executive in brigades and smaller units.) The chief of staff or executive is the principal assistant and adviser to the commander. He may transmit the decisions of the commander to appropriate staff officers for preparation of the necessary orders, or transmit them in the form of orders to those who execute them. He is the principal coordinating agency of the command. He performs the following specific duties:

Formulates and announces policies for the general operation of the staff.

Directs and coordinates the work of the general and special staff in respect to:

(1) Activities of the sections within the general and special staff groups.

(2) Relations between the general and special staff groups.

(3) Relations between the general and special staff groups and the troops.

Keeps the commander informed of the enemy situation, the situation relative to adjacent and supporting units, and the situation of the command as to location, strength, morale, training, equipment, supply, evacuation, and general effectiveness.

Represents the commander during his temporary absence or when authorized to do so. (In certain small units the second in command is designated by Tables of Organization as executive, hence succeeds automatically to the command when the commander ceases to function.)

Receives decisions from the commander and takes the following action:

(1) Makes such additional decisions as may be directed by the commander and gives necessary instructions to the staff in furtherance of these decisions.

(2) Allots the detailed work of preparing plans and orders and when time permits coordinates the resulting drafts and submits them to the commander for approval.

Takes steps to insure that all instructions published to the command are in accord with policies and plans of the commander.

By personal observation, and with the assistance of the general and special staff sections, sees that the orders and instructions of the commander are executed.

Makes a continuous study of the situation with a view of being prepared for future contingencies.

Assembles the routine staff section reports and after their approval by the commander forwards required copies to higher headquarters.

Deputy Chief of Staff (in army and higher units only). The relations of the deputy chief of staff to other members of the staff and to the troops are similar to those of the chief of staff. The deputy chief of staff assists the chief of staff and acts for the latter in his absence.

Secretary of the General Staff (in army and higher units only). The secretary of the general staff performs the following duties:

Acts as executive officer for the chief of staff and deputy chief of staff.

Maintains an office of temporary record for the chief of staff and deputy chief of staff.

Routes papers received in the office of the chief of staff to their proper destinations.

Forwards correspondence to its destinations in the headquarters and establishes a follow-up system to insure prompt action on and return of papers.

Receives officials visiting headquarters for the purpose of conferring with the commander, the chief of staff, or deputy chief of staff.

Collects statistical data for the commander, chief of staff, and deputy chief of staff.

Personnel (G-1) Section. The personnel section is charged with the formulation of

policies and the supervision of the execution of administrative arrangements pertaining to personnel of the command as individuals, civilians under supervision or control of the command, and prisoners of war.

In divisions in which there is no provision for a G-1 section, the supervision of activities listed below will be assigned to the G-4 section, or as may be directed by the division commander.

The specific duties of the personnel section may include the planning for and supervision of activities concerning—

(1) Procurement, classification, reclassifications, assignment, pay, promotion, transfer, retirement, and discharge of all personnel. (Coordination with G-3 in assignment and transfer of personnel.)

(2) Replacement of personnel. (Coordination with G-3 for priorities.)

(3) Decorations, citations, honors, and awards.

(4) Leaves of absence and furloughs.

(5) Rewards and punishment.

(6) Internal arrangement of headquarters. (Coordination with G-4 for construction.)

(7) Religious, recreational, and welfare work; supervision of military and non-military agencies devoted to such work. (Coordination with G-3 for allotment of time for recreational and morale work.)

(8) Army postal service. (Coordination with G-4 for movement; G-2 for censorship.)

(9) Strength reports and graphs, casualty reports, prisoner of war reports, station lists, and other personnel statistics.

(10) General regulations and routine administration which especially concern individuals, or routine administration not specifically assigned to another general staff section.

(11) Furnishing the commander advice on morale.

(12) Collection and disposition of stragglers.

(13) Collection and disposition of prisoners of war. (Coordination with G-2 for identifications and questioning; G-4 for transportation and for location and construction of prisoner of war enclosures.)

(14) Recommendations as to provisions for shelter for the command and administration of quartering areas. (Coordination with G-3 for location of areas; G-4 for construction.)

(15) Sanitation. (Coordination with G-4.)

(16) Relations with civil government and civilians in the theater of operations, including initial establishment and operation of military government or martial law. (FM 27-5.) (Coordination with G-4 for transportation for civilians to be evacuated and feeding of civilians; G-3 for evacuation of civilians as it affects operations; G-2 for censorship.)

(17) Maintenance of law and order within the command.

(18) Graves registration service, including burials. (Coordination with G-4 on acquisition of cemeteries.)

(19) Supervision of matters concerning members of our forces who are prisoners in enemy hands.

(20) Preparation of such parts of administrative plans and orders as relate to activities under the supervision of the personnel section. (Coordination with G-4.)

Military Intelligence (G-2) Section. The military intelligence section is charged with the planning and preparation of orders and to some extent with operations pertaining to the collection, evaluation, interpretation, and distribution of information of the enemy and with counterintelligence activities. Its primary function is to keep the commander and all others concerned informed regarding the enemy's situation and capabilities.

Operations and Training (G-3) Section. The operations and training section is charged with those functions of the staff which relate to organization, training, and combat operations. It is responsible for tactical and training inspections, as directed by the commander (AR 265-10).

The specific duties of the operations and training section may include:

- (1) Preparation and coordination of plans for and supervision of:
 - (a) Mobilization of the command.
 - (b) Organization and equipment of units. (Coordination with G-4 for allocation of equipment.)
- (2) Preparation and coordination of plans for and supervision of training of units and individuals, including:
 - (a) Preparation of training directives, programs, and orders. (Coordination with G-2 for combat intelligence training.)
 - (b) Selection of training sites and firing and bombing ranges. (Coordination with G-4 on preparation of sites and ranges.)
 - (c) Organization and conduct of schools.
- (3) Operations, to include, in general: tactical and strategical studies and estimates; plans and orders based thereon; supervision of combat operations; and future planning. Specific duties relative to operations may include:
 - (a) Continuous study of the tactical situation, as affected by:
 1. The enemy situation. (Coordination with G-2.)
 2. Instructions from higher units.
 3. Actions of adjacent or supporting units.
 4. Location, morale, and capabilities of the troops. (Coordination with G-1 for morale matters.)
 5. Needs for replacements and reinforcements. (Coordination with G-1 for replacements.)
 6. Terrain and weather conditions. (Coordination with G-2.)
 7. Status of equipment and supplies. (Coordination with G-4 for priorities of replacement of matériel and allocation of supplies.)
 - (b) Preparation of estimates, reports, and recommendations based on the tactical situation.
 - (c) Preparation of plans for and supervision of activities concerning:
 1. Reconnaissance and security measures. (Coordination with G-2 for intelligence missions of combat troops.)
 2. Troop movements. (Coordination with G-4 for movements requiring transportation in addition to organic transportation and for routes.)
 3. Tactical employment of units. (Coordination with G-4 for influence of supply and evacuation on operations; G-2 for capabilities of enemy; G-1 on morale of troops.)
 4. Defense of administrative installations and lines of communication. (Coordination with G-4.)
 5. Tactical measures to preserve secrecy and effect surprise. (Coordination with G-2.)
 - (d) Preparation and authentication of field orders and operation maps required to carry out the tactical plan, and their transmission to units and staff officers concerned. (Coordination with G-2 for maps and for paragraphs and annexes dealing with enemy information, reconnaissance, and counterintelligence measures; G-4 for paragraph dealing with administrative matters.)
 - (e) Maintaining contact with the commanders of subordinate units; observing or supervising troop movements and tactical operations as directed by the commander.
 - (f) Establishment of liaison with adjacent, higher, and subordinate units.
 - (g) Supervision of signal communication.
 - (h) Preparation of tentative plans for subsequent phases of a tactical operation and for future tactical operations. (Coordination with G-2 for enemy capabilities; G-4 for practicability of operations from a supply point of view.)
- (4) Recommendations to the commander of priorities for assignment of personnel and equipment. (Coordination with G-1 for assignment of personnel; G-4 for allocation of equipment.)

The organization of the operations and training section in each unit will vary with the personnel available and the work to be accomplished. In corps and higher units,

separate subsections pertaining to administration, organization, training, operations, and troop movements may be organized.

Supply and Evacuation (G-4) Section. The supply and evacuation section is charged with the preparation of policies for, and the supervision of execution of arrangements for supply, evacuation, transportation, and other administrative matters related thereto. It is responsible for advising the commander relative to the extent of the administrative support that can be given to any proposed strategic or tactical line of action, and for recommendations as to the necessary decisions concerning supply and evacuation. It is further responsible for the development of those details of the administrative plan which pertain to its functions, the preparation of the necessary orders, and the supervision of their execution.

The specific duties of the supply and evacuation section may include the planning for and supervision of activities concerning:

- (1) Procurement, storage, and distribution of all supplies including animals. (Coordination with G-3 for priority of allocation of supplies.)
- (2) Location of supply, evacuation, and maintenance establishments.
- (3) Transportation of supplies by land, air, and water.
- (4) Construction and maintenance of roads and trails, docks, and airdromes.
- (5) Maintenance of equipment. (Coordination with G-3 for priorities.)
- (6) Recommendations for allocation of small arms ammunition and antitank mines. (Coordination with G-3.)
- (7) Traffic control. (Coordination with G-3 for tactical plan and secrecy.)
- (8) Construction, operation, and maintenance of utilities and other facilities relating to supply, shelter, transportation, and hospitalization, but exclusive of fortifications.
- (9) Evacuation and hospitalization of men and animals.
- (10) Assignment and movement of supply, medical, technical, and labor troops not employed as combat troops. (Coordination with G-3 to avoid conflict with tactical movements.)
- (11) Salvage.
- (12) Collection and disposition of captured supplies, equipment, and animals. (Coordination with G-2 for examination of matériel.)
- (13) Recommendations concerning protection of lines of communication and rear establishments. (Coordination with G-3.)
- (14) Recommendation as to location of rear boundaries.
- (15) Recommendation as to location of rear echelon of headquarters. (Coordination with G-1.)
- (16) Property responsibility.
- (17) Funds and priority of expenditure.
- (18) Construction, operation, and maintenance of military railways.
- (19) Operation of inland waterways.
- (20) Recommendations as to new types of equipment. (Coordination with G-3.)
- (21) Procurement of real estate, shelter, and facilities, including their leasing, repair, maintenance, and disposition.
- (22) Acquisition and improvement of airplane bases.
- (23) Preparation, authentication, and distribution of administrative orders, both fragmentary and complete. (Coordination with G-3 for details of tactical plan; G-1 for details pertaining to the activities supervised by the personnel section.)

The organization of the supply and evacuation section in each unit depends upon the personnel available and the work to be accomplished. In corps and higher units, separate subsections pertaining to administration, construction, evacuation, supply, and transportation may be organized.

THE SPECIAL STAFF

General. General functions. The special staff operates with the general staff under the policies prescribed by the unit commander. The general functions of the special staff group include:

(1) Technical and tactical advice and recommendations to the commander and his general staff.

(2) Preparation of plans, estimates, and orders in order to relieve the general staff of routine duties.

(3) Coordination with the general staff sections of their tactical and administrative plans and activities.

Dual functions. In certain cases, special staff officers are also commanders of troops or heads of technical, supply, or administrative services and as such have the usual functions of command or control over such troops or services; for example, the commander of the artillery troops of an infantry division is also the division artillery officer. There two functions of staff and command, although vested in a single individual, are separate and distinct in that each involves different responsibilities and duties, and the exercise of one should not be confused or permitted to interfere with the exercise of the other. On the contrary, this dual function of certain officers has many advantages in facilitating the proper discharge of both staff and command duties of the officers concerned.

Relations With Subordinate Units. While certain of the duties charged to special staff officers apply to the unit as a whole, the unit commanders are primarily responsible for all phases of planning, training, and execution of all activities of their commands; and directions or instructions issued subordinate units must be transmitted through the proper channels of command and not directly from one special staff officer to the corresponding special staff officer in a subordinate unit. Within the limits and in the manner prescribed by the division or higher commander a special staff officer's duties may include:

Technical and tactical supervision, coordination, and inspection of subordinate units of his arm or service not commanded by him.

Appropriate technical inspection of all subordinate units.

Handling routine reports directly from corresponding staff officers of subordinate units.

Composition. Divisions and higher units. The special staffs of divisions and higher units include such of the following officers as are assigned to the unit:

- (1) Air officer.
- (2) Antiaircraft officer.
- (3) Artillery officer.
- (4) Chemical officer.
- (5) Engineer.
- (6) Headquarters commandant (combined with provost marshal in certain units).
- (7) Ordnance officer.
- (8) Provost marshal (combined with headquarters commandant in certain units).
- (9) Signal officer.
- (10) Surgeon.
- (11) Commanders of attached combat units having no special staff representative.
- (12) Liaison officers.
- (13) Adjutant general.
- (14) Chaplain.
- (15) Finance officer.
- (16) Inspector general.
- (17) Judge advocate.
- (18) Officer in charge of civil affairs (initially in GHQ and other territorial commands, when required). (FM 27-5.)
- (19) Quartermaster.

Sections. Special staff sections are shown in Tables of Organization. They are headed by the special staff officers indicated in *a* above. The title may be followed by the designation of the unit when necessary, thus: Financial Officer, II Corps.

Brigades and smaller units. In addition to the staff officers corresponding to the chief of staff and the four general staff sections in larger units (executive, S-1, S-2, S-3,

and S-4), the staffs of brigades, regiments, and battalions, corresponding to the special staffs of larger units, include such of the following as may be assigned to the unit:

- (1) Communication officer.
- (2) Gas officer.
- (3) Liaison officer(s).
- (4) Reconnaissance officer.
- (5) Surgeon.
- (6) Commanders of attached combat units not represented on the staff.
- (7) Chaplain.
- (8) Motor officer (designated as maintenance officer in some units).
- (9) Munitions officer (armament officer in Air Corps units). (Duties frequently combined with those of S-4.)

Forward and rear echelons. (1) In divisions and higher units the headquarters usually are divided so as to include the special staff officers assigned to the units and listed above in the forward echelon, and in the rear echelon. In certain units a special staff section at the rear echelon may have a representative at the forward echelon.

(2) In brigades and smaller units the headquarters usually are divided so as to include the special staff officers assigned to the unit and listed above from (1) to (6), inclusive, in the forward echelon, and those from (7) to (9), inclusive, in the rear echelon.

Duties. The duties of the several special staff officers, as listed herein, are intended as a guide. The commander may and should adjust duties to meet operating conditions. In the performance of their duties, special staff sections are ordinarily subject to supervision and coordination by appropriate general staff sections. Certain of the special staff officers whose duties are listed have both command and staff functions. *Only those duties pertaining to their functions as staff officers are listed in this chapter.*

Air Officer. Adviser to the commander and staff on air matters.

Preparation of plans for the use of air units, including recommendations for their allotment to subordinate units.

Administrative responsibility through subordinate air base commanders for the air units operating under theater control (air officer, theater of operations, only).

Coordination, within limits prescribed by the commander, of the utilization of all air units of the command.

Determination of requirements, procurement, storage, and distribution of aircraft ammunition and air technical supplies. Furnishing information as to the status of aircraft ammunition and air technical supplies.

Obtaining and disseminating meteorological data for use by the command, except that obtained by the field artillery and other units for their own use.

Examination of captured aviation equipment.

Antiaircraft Officer. Adviser to the commander and staff on all antiaircraft matters, including passive defense measures.

Determination of requirements and recommendations for apportionment of anti-aircraft artillery ammunition.

Planning for coordination of all means of active defense against air operations in cooperation with the unit air officer.

Recommendations as to missions for antiaircraft artillery including recommendations for allotment to subordinate units.

Artillery Officer. Adviser to the commander and staff on field artillery matters.

Supervision of the training of the field artillery of the unit.

Preparation of plans for the use of field artillery, including recommendations for its allotment to subordinate units.

Coordination of the survey system within field artillery units.

Supervision of observation, signal communication, and liaison within the field artillery.

Supervision of supply of meteorological data for the field artillery.

Determination of requirements, recommendations for apportionment, and supervision

of distribution of field artillery ammunition. Furnishing information as to status of ammunition supply.

Coordination of fires of the field artillery of subordinate units.

Plans for artillery missions to be performed by observation aviation.

Collection and dissemination of information pertaining to hostile artillery and other targets through artillery intelligence agencies.

Chemical Officer. Adviser to the commander and staff on all chemical matters, including the use of chemicals by the various arms.

Preparation of plans for the use of chemical troops, including recommendations for their allotment to subordinate units.

Supervision of the operations of chemical troops not assigned to subordinate units.

Supervision, within limits prescribed by the commander, of all chemical training, including inspections.

Supervision, within limits prescribed by the commander, of collective protective measures, including gas-proofing of inclosures, and the decontamination of gassed areas, equipment, and vehicles.

Examination of captured chemical equipment, and collection and evaluation of other information concerning means and methods of utilization of chemicals by the enemy and our own troops and the results obtained.

Determination of requirements, procurement, and distribution of chemical equipment and supplies for all units, and chemical munitions for chemical troops.

Operation of chemical storage, maintenance and repair facilities, and rehabilitation of salvaged chemical material.

Technical inspection of supplies, equipment, and ammunition, stored and issued by the Chemical Warfare Service.

Supervision of the filling of such chemical munitions as may be prescribed to be performed in the theater of operations.

Estimation of requirements and recommendations for apportionment of chemical munitions to chemical troops. Furnishing information as to the status of chemical warfare service ammunition supply.

Engineer. Adviser to the commander and the staff on engineer matters.

Preparation of plans for the use of engineer troops, including recommendations for their apportionment to smaller units.

Determination of requirements, procurement, storage, and distribution of engineer equipment and supplies, including camouflaging materials.

Construction, maintenance, and repair of camps, cantonments, warehouses, hospitals, and other structures, including incidental installations (except signal communications) of roads and trails, and all means of river crossings, of docks, and of airdromes and landing fields.

Supply of all fortification materials, and the construction of such defensive works as may not be assigned to other troops.

Construction, repair, maintenance, and operation of railways, portable and fixed electric light plants, water supply systems, and all other utilities of general service not otherwise assigned.

Military mining, demolitions, and the construction and removal of obstacles.

Surveys, mapping, and the procurement, production, and distribution of maps.

Engineer reconnaissance.

Recommendations as to traffic regulations on roads and bridges as may be required by their physical condition.

Preparation and posting of signs for marking routes.

Supervision, within limits prescribed by the commander, of engineer and camouflage activities in subordinate units, including such work performed by troops other than engineers.

Development within the unit of measures for camouflage of personnel and installation; preparations of instructions concerning camouflage, use of camouflage material, and protective coloration of all equipment except aircraft.

Examination of captured engineer equipment.

Headquarters Commandant. Local security of the headquarters.

Internal administration and arrangements for moving headquarters.

Detail of orderlies and messengers.

Supervision of headquarters mess.

Messing and quartering of casualties.

Reception of visitors at certain headquarters.

Ordnance Officer. Adviser to the commander and staff on ordnance matters.

Preparation of plans for use of ordnance troops not assigned to subordinate units.

Collection and evaluation of information concerning means and methods of utilization of ordnance matériel and ammunition by the enemy and our own troops, and the results obtained.

Procurement, storage, and distribution (in accordance with apportionments as approved by the commander) of ammunition and of other ordnance supplies and equipment.

Operation of ordnance storage, maintenance, and repair facilities, including salvage and repair of ordnance matériel.

Technical inspection of ordnance equipment.

Supervision, within limits prescribed by the commander, of ordnance activities in subordinate units.

Provost Marshal. Adviser to the commander and staff on matters pertaining to the duties of the military police.

Enforcement of traffic control regulations.

Apprehension and disposition of stragglers, absentees, and deserters.

Collection and custody of prisoners of war.

Enforcement of police regulations among members of the military forces and in areas occupied by troops.

Cooperation with civil authorities on plans including those for police protection, black-outs, antisabotage activities, and the like.

Control of the civil population, including circulation of individuals and mass movements of refugees, when circumstances require.

Supervision of installations for refugees and the feeding of noncombatants, when necessary.

Criminal investigation activities and custody and disposition of offenders.

Coordination, within limits prescribed by the commander, of military police in subordinate units.

Recommendations as to location of straggler line and collecting points for prisoners of war.

Signal Officer. Adviser to the commander and staff on signal matters, including the location of command posts.

Preparation of routine and combat orders relating to signal communication.

Planning, installation, and supervision of the aircraft warning net, when so directed.

Preparation, publication, storage, accounting for, and distribution of codes and ciphers.

Determination of requirements, procurement, storage, and distribution of signal equipment and supplies.

Procurement and operation of signal maintenance and repair facilities.

Technical inspection of signal equipment, within limits prescribed by the commander, and recommendations relative to its care and utilization.

Technical supervision, within limits prescribed by the commander, of signal operations of the command, including coordination of the employment and of the training of signal agencies of subordinate units.

Supervision of the installation, maintenance, and operation of the signal system, including the message center of the unit.

Supervision of such activities pertaining to the signal intelligence, pigeon, and, except in Air Corps units, photographic services as affect the unit.

Examination of captured signal equipment.

Surgeon. Adviser to the commander and staff on all matters pertaining to:

- (1) Health and sanitation of the command and of occupied territory.
- (2) Training of all troops in military sanitation and first aid.
- (3) Location and operation of hospitals and other medical establishments and of the evacuation service.

Supervision, within limits prescribed by the commander, of training of medical troops, including inspections.

Determination of requirements, procurement, storage, and distribution of medical, dental, and veterinary equipment and supplies.

Supervision, within limits prescribed by the commander, of the operations of elements of the medical service in subordinate units.

Preparation of reports and custody of records of casualties.

Examination of captured medical equipment.

Commanders of Attached Combat Units Having No Special Staff Representative. Commanders of attached combat units having no special staff representative act as advisers to the commander and his staff on tactical and technical matters relating to their units.

Adjutant General. Handling all official correspondence, except that pertaining to combat orders and instructions, in accordance with regulations and approved policies. In cases for which no policy has been established, he initiates action to secure a policy covering such cases.

Authentication and distribution of all orders and instructions, except those pertaining to combat operations.

Maintenance of the office of record for the headquarters.

Operation of the Army postal service in the unit. In divisions and certain higher units upon mobilization, a postal section is organized and operated by a designated postal officer under the supervision of the adjutant general.

Establishment of the Prisoner of War Information Bureau prescribed by the Hague Convention (GHQ and theater of operations).

Operation, in accordance with approved policies, of activities at the headquarters pertaining to:

(1) Classification of all individuals joining the command, their subsequent assignment, reclassification, and reassignment, their promotion, transfer, retirement, and discharge.

(2) Procurement and replacement of personnel.

(3) Decorations, citations, honors, and awards.

(4) Leaves of absence and furloughs.

(5) Education (exclusive of tactical and technical).

(6) Recreation and welfare and all other morale matters not specifically charged to other agencies.

Custody of the records of all personnel belonging to the command which are not kept in some subordinate unit.

Preparation and distribution of the station list.

Preparation and submission of reports on strength, casualties, captured matériel, prisoners of war, and incidental returns.

Supplying of blank forms, publications, and instructional matter furnished by the Adjutant General's Department.

Operation of office procedure as regards administrative matters, including recommendations as to similar arrangements in headquarters of subordinate units.

Chaplain. Adviser to the commander and staff in religious and moral activities of the command.

Supervision of the spiritual welfare of the command.

Conduct of religious services, including funerals.

Spiritual ministrations to the sick and wounded.

Correspondence with relatives of deceased personnel.

Coordination of the religious work of the various welfare societies.

Supervision and coordination, within limits prescribed by the commander, of the training and work of the chaplains of subordinate units.

Recommendations as to assignments and transfers of chaplains.

Providing the services of chaplains for units requiring them.

Preparation of estimates and allotment of funds for religious activities not specifically charged to other agencies of the command.

Preparation of reports relative to the religious and moral activities of the command.

Finance Officer. Adviser to the commander and staff on fiscal matters.

Payment of the command, and payments for hired labor, for supplies purchased or requisitioned, and for damages or claims.

Custody of financial records.

Custody and disbursement of all Government funds, including such special funds as the commander may direct.

Inspector General. Inspections and investigations as the commander may direct. For sphere of inquiry see AR 20-5, 20-10, 20-30, and 20-35.

Inspection of all commands, units, systems, transportation, installations, accounts, and nonmilitary agencies as required by the commander.

Judge Advocate. Adviser to the commander and staff, and to other members of the command in proper cases, on questions of law.

Supervision of the administration of military justice within the command.

Review and recommendation as to the action to be taken upon charges preferred for trial by, and records of trial of, military courts.

Officer in Charge of Civil Affairs (GHQ and other territorial commands when required). Adviser to the commander on matters pertaining to the administration of civil affairs in the theater of operations (FM 27-5).

Supervision of such agencies as may be established for the required control of civil affairs in occupied territory.

Quartermaster. Adviser to the commander and staff on quartermaster matters.

Determination of requirements, procurement, storage, and distribution of quartermaster equipment and supplies, including vehicles.

Procurement and disposition of real estate and facilities, including leasing.

Procurement and operation of quartermaster utilities, storage, maintenance, and repair facilities.

Operation of:

- (1) Remount service.
- (2) General service pool of labor.
- (3) Salvage service.
- (4) Graves registration service.
- (5) Motor transport service and motor maintenance units.

Transportation of troops and supplies by land, water, and commercial air means, except such as may be allocated to another arm or service.

Technical inspection of motor and animal transportation, and supervision of quartermaster activities in subordinate units within limits prescribed by the commander.

Examination of captured quartermaster equipment.

Special Staff Officers of Smaller Units. In brigades and smaller units, general and special staff duties merge into each other, and one staff officer frequently is charged with duties of both general and special staff nature. In some units the same officer performs the duties of more than one of the staff sections.

STAFF RECORDS, MAPS, AND REPORTS

Staff Records. A system of staff section records is essential in order to have information available for:

- (1) Command decisions during operations.
- (2) Higher headquarters.
- (3) Historical record (AR 345-105).

The refinement of the system of making and keeping unit or staff records will vary with the factors of available time, opportunity, and personnel.

Office of Record. The office of record is that of the adjutant general or adjutant.

Staff sections temporarily retain copies of documents needed in their current work, returning them to the office of record when no longer needed.

Journals (See Plate 2). A journal is a chronological record of events affecting the unit or staff section. The amount of detail recorded in journals will vary with the personnel available in the staff section and the nature of the operations being conducted. The minimum detail necessary to fix the time or other facts concerning important events is the ideal. Important incidents are recorded as they occur, such as time of receipt or transmission of important messages, visits of higher commanders and staff officers, and absences from the command post of the commander or section chief. A brief synopsis of written messages or orders should be entered in the journal and the originals filed in the journal file. Oral messages or orders should be entered in full when practicable.

In corps and higher units and in divisions when the personnel of the staff section is adequate, each staff section keeps a journal of its activities. The assembled journals of the staff sections should form a complete picture of the operations of the unit for a given period. In divisions, when the personnel of the staff sections is inadequate, two or more section journals may be combined.

In brigades and smaller units, a combined unit journal is usually sufficient and should be kept by the adjutant or plans and training officer or as directed by the unit commander. In highly mobile units such as armored units, it may be necessary for each staff section to keep its own journal.

The journal is closed daily or at the end of a phase or period as determined by higher authority.

The journal is a permanent record of the operations of the unit and is annexed to reports after action against the enemy (AR 345-105). Original entries should not be altered but supplemented when necessary by later entries.

Situation Maps. In corps and higher units, and in divisions when the personnel of the general staff sections is adequate, each general staff section keeps a situation map posted to date showing the dispositions and activities that concern the section. Data should be posted on the map as soon as received, after which the items should be entered in the journal. In divisions, when the personnel of the general staff sections is inadequate, a joint G-2—G-3 situation map and a joint G-1—G-4 situation map may suffice.

(1) In most brigades and smaller units, a combined situation map kept under the supervision of the unit executive is usually sufficient.

(2) In highly mobile units such as armored units, each staff section keeps its situation map up to date even while moving.

Situation maps showing the situation at a particular time are often prepared as appendixes to special or periodic staff reports to permit the written contents of reports to be reduced to a minimum.

Operation, Administrative, and Circulation Maps. Operation maps are prepared and issued by the G-3 (S-3) section.

Administrative and circulation maps are prepared and issued by the G-4 (S-4) section.

Reports. The character and scope of staff and unit reports will vary with the requirements of the commander or the higher headquarters at the time the reports are called for.

The merit of a report is not measured by its length. A concise presentation of important points usually is all that is required.

In divisions and higher units, each staff section prepares and submits such periodic or special reports pertaining to its activities as may be directed or required.

In brigades and smaller units, a single unit report prepared under the supervision of the executive is usually sufficient.

Reports on the situation or events will be of maximum usefulness to the commander, other staff sections, and higher headquarters when made as of a particular hour. Such

The number of written reports required from subordinate units should be held to

..... Journal ¹

From: (Date and hour)

Place

Time ²		Serial No.	Time dated ³	Incidents, messages, orders, etc.	Action taken ⁴
In	Out				

Plate 2. Form for Unit Journal.

1. The journal is the daybook of the section or unit. It contains briefs of important written and oral messages received and sent and notations of periodic reports, orders, and similar matters that pertain directly to the section or unit. Copies of messages and other data pertaining to the section or unit and furnished by it for purposes of information to other sections or units are not entered in the journals. The journal is supplemented by the journal file; this file contains copies of all messages, orders, and other documents arranged in the order of entry in the journal. A brief synopsis of the contents of oral messages or orders should be entered in the journal proper.

3. Refers to time information originated, and thus calls attention to age of the information.

the minimum. Wherever possible, personal or telephone conferences should replace written reports.

Commanders may require reports from subordinate units at certain times; for example, a report may be required at a time in the early morning, noon, and near nightfall, regardless of the information available. Negative information may be valuable.

LIAISON

General. Liaison is the connection between units or other elements, established by a representative—usually an officer—of one unit who visits or remains with another unit. Its purpose is to promote cooperation and coordination of effort by personal contact.

Types. Liaison may be established between supporting and supported units; between adjacent units (lateral liaison); from subordinate to higher headquarters; and from higher to subordinate headquarters.

Between Supporting and Supported Units. Liaison between supporting and supported units, if established, is the function of the supporting unit.

Field artillery habitually establishes liaison with supported units for the primary purpose of obtaining information as to the needs for supporting fire. For example, liaison is established by direct support artillery battalions with the supported front line battalions and also with the regiment. (FM 6-20).

Liaison between other supporting and supported units is established when desirable.

Between Adjacent Units. Liaison between adjacent units in combat is established when desirable. If used, it may be directed by a higher commander or established on the initiative of adjacent commanders.

From Subordinate to Higher Headquarters. A subordinate unit may be directed to establish liaison with higher headquarters. Such liaison may be made routine by prescribed standing operating procedure.

From Higher to Subordinate Headquarters. The usual purposes of liaison from higher to subordinate headquarters are to obtain information, transmit orders, clarify the existing situation and orders, and receive and transmit requests for assistance.

This liaison is maintained when authorized by the higher commander.

Selection of Liaison Officers. The maximum effectiveness of liaison missions will be secured if the officer selected for this duty:

- a. Has the confidence of his commander.
- b. Is favorably known, either personally or by reputation, by the commander and staff of the unit to which sent.
- c. Has a sound and comprehensive knowledge of tactics.
- d. Possesses tact.
- e. Has had experience or training as a liaison officer.

Duties of Liaison Officers. *Prior to departure* the liaison officer should:

(1) Become familiar with the situation of his own unit and so far as practicable with that of the unit to which sent.

(2) Ascertain definitely his mission.

(3) Insure that arrangements for communication (signal and transportation) are adequate.

(4) Obtain credentials in writing unless obviously unnecessary.

On arrival at headquarters to which sent, the liaison officer should:

(1) Report promptly to the commander, stating his mission, and exhibiting his directive or credentials, if in writing.

(2) Offer his assistance to the commander, if appropriate.

(3) Arrange for the transmission of messages he may be required to send.

(4) Arrange to obtain information required by his mission.

(5) Familiarize himself with the situation of the unit to which sent.

During his liaison tour the liaison officer should:

(1) Further harmonious cooperation between his own headquarters and the one to which sent.

(2) Accomplish his mission without interfering with the operations of the headquarters to which sent.

(3) Keep himself informed of the situation of his own unit and make that information available to the commander and staff of the unit to which he is sent. (Such action is of special importance to liaison officers of attached or supporting units.)

(4) Keep an appropriate record of his reports.

(5) Report on those matters within the scope of his mission.

(6) Advise the visited unit commander of the contents of reports to be sent to his own headquarters.

(7) Make prompt report to his own headquarters if he is unable to accomplish his liaison mission.

(8) Report his departure to the visited unit commander on the completion of his mission.

On return to his own headquarters the liaison officer should:

(1) Report on his mission.

(2) Transmit promptly any requests of the commander from whose headquarters he has just returned.

Duties of Sending and Receiving Headquarters. The commander of the headquarters sending a liaison officer should:

(1) Give the liaison officer definite and detailed instructions, in writing if appropriate, as to the liaison mission.

(2) Inform the liaison officer of the commander's plans, especially as they affect the unit to which he is to be sent.

(3) Insure that adequate facilities are available for communication (signal and transportation means) between the liaison officer and the sending headquarters.

The commander of the headquarters receiving a liaison officer should:

(1) Give the liaison officer all assistance possible, compatible with the normal operations of the headquarters.

(2) Keep the liaison officer informed as to the plans for future employment of the unit visited.

(3) Give the liaison officer free access to those staff sections or troops having data pertinent to the liaison mission.

The contact established by liaison officers does not relieve commanders from the responsibility of keeping the next higher, lower, and adjacent commands informed of the situation through normal channels.

CHAPTER VII

SUPPLY AND EVACUATION OF LARGE UNITS

Scope. This chapter deals with the problems of supply and evacuation of large units within the combat zone. The system of supply of small units, in garrison as well as field service, is presented in detail in Chapter X, Part III, of this volume. The vast problem of procurement of supplies and adequate provisions for the mobilization of matériel and industrial organizations essential to wartime needs is made the specific function of the Assistant Secretary of War, under the direction of the Secretary of War, by the provisions of the National Defense Act of 1916, as amended. The purpose of this chapter is to define and illustrate this vital phase of military operations as it must be accomplished in the field with sufficient detail to enable the reader to visualize the problem and its methods of accomplishment.

The modern army is dependent to an amazing degree upon a multitude of mechanical devices, motor transportation, highly specialized arms and equipment. An army consumes vast quantities of supplies of many kinds such as food, gasoline, and ammunition. Its equipment is subject to destruction in battle, to unusually severe wear and tear, to loss from many causes. Notwithstanding these obvious difficulties, the army must enter upon a campaign without shortage of essential equipment. During combat the vital requirements must be replaced substantially as rapidly as they are consumed. When the battle is over the army must be refitted. These operations provide a tremendous problem for the supply services.

The enormity of the undertaking may be better visualized by considering the supply and evacuation requirements which confront a war strength reinforced corps as they are now estimated for the *first day* of attack of a position.

Tons of rations required	359
Tons of small arms ammunition required	730
Tons of all other ammunition required	3768
Tons of Class II, III, IV supplies required	898
Casualties to be evacuated	3400

Considering the factor of tonnage alone, six trains hauling approximately 1000 tons each must be brought into the corps area and unloaded; the supplies have to be placed in depots, other supply points, or distributing points so that they will flow forward to the troops as they are required. The components of these tons and trainloads must be visualized as a multitude of separate items, each of which must be forwarded in the necessary quantities and must reach the unit for which intended in time to meet its requirements.

Modern armies have been able to attain this objective. It requires training of supply specialists, the development of the necessary facilities, and understanding by the using services of the system adopted so that they may supply the necessary information in time to permit the service of supply to operate efficiently. Perhaps the greatest requirement is foresight so that future needs are properly anticipated. Not the least important factor in this foresight is appreciation of the scope and importance of the basic problem.

It is a principle that the necessary supplies must be made available to support the commander's tactical plan. If this cannot be accomplished for any reason whatever the commander must be informed of the fact as it must affect his further actions. It requires careful estimate of the requirements well in advance of a projected, large-scale operation. The supplies must be obtained and placed in depots for distribution. As required by the troops, they must be forwarded and distributed. Breakdown in the supply service may have a disastrous effect upon the outcome of battle.

General Principles Governing Supply and Evacuation. Each commander of a unit in the chain of supply is responsible for providing adequate supplies and replacements (men and animals) for its own next subordinate units *at the time and place needed*. Anxiety as to supplies must not divert the attention of the troops from their tasks as concerns action with the enemy. For example, the division commander is responsible that his

infantry brigades, artillery brigade, and other organic or attached units are furnished with their requirements. Thus the impetus of the movement of supplies and replacements is said to flow from the rear to the front.

The same principle applies to the evacuation of sick or wounded men and animals. The higher unit assumes responsibility of relieving the next lower unit of its casualties.

Combat units must be free from the burden of excessive supplies. Stockage of supplies must be echeloned in depth to provide against shifting tactical situations and interruptions in the rate of delivery.

Whatever the actual system of supply adopted in a particular situation, it must be flexible. The conditions of battle are subject to constant change. The fact that a division occupied a certain location under a known situation at the time the request for supplies was originated does not mean at all that the location or situation will necessarily be the same at the time of delivery. The method adopted must be flexible so that these changing conditions will not stop the flow. *Supplies must find the troops, not the troops find the supplies.* Further, the plan must be simple. This much overworked term is subject to various interpretations as the easy way to accomplish any task is not usually apparent to the unskilled or the novice. Certainly the plan must avoid complexities.

Operation of the Supply System. The commander of a military unit is responsible for the operation of his system of supply just as he is responsible for all other phases of its operation. In the execution of this responsibility he is assisted by the heads of the supply services within his organization and by the G-4 section of his general staff.

In the infantry division the following officers of the special staff are operating agencies for supplies pertaining to their own branch:

The Division Quartermaster.

The Division Ordnance Officer.

The Division Surgeon.

The Division Signal Officer.

The Division Chemical Warfare Officer.

The commander of the artillery of the division.

The G-4 section of the general staff, among other allied responsibilities, is charged with making certain that the plan of supply proposed by the operating agencies will be adequate to the commander's tactical plan; that the operating agencies are coordinated among themselves as to location of installations, priorities on delivery, and use of means of transport and labor; the section makes certain that the necessary adjustments are made in the basic plan to meet changing situations. Finally, the G-4 of a command is responsible to the commander that needs are foreseen and provided for and that the system "works."

Classification of Supplies. For purposes of convenient reference, supplies required by troops in the field are classified as shown below. It will be noted that items furnished by two or more supply services may be placed in the same classification.

Class I. Those items such as rations, forage, and illuminants which are consumed at an approximately uniform daily rate irrespective of combat operations or terrain and which do not necessitate special adaptation to meet individual requirements. These supplies are usually forwarded on an automatic basis (see definitions below). Calls for Class I supplies are made by the daily telegram. The depots make up the shipment as required. It is loaded on the daily train and dispatched through the regulating station to the proper railheads. At the railhead distribution is effected by the quartermaster.

Class II. Those authorized articles of equipment which, though consumed at an approximately constant rate, are for the personal use of the individual and necessitate special arrangements to meet individual requirements; examples are clothing and gas masks. These items are usually made available in the form of credits in designated depots on which units may draw as required. Unit supply officers submit approved requisitions to the proper supply service of the next higher echelon in the chain of supply where, if available, they are filled from stock. If requisitions are filled from the depot, shipments are made up and dispatched through the regulating station to the proper army supply establishment as outlined above for Class I supplies.

Also those authorized articles of equipment for which allowances are established by

Tables of Organization and *Tables of Allowances*, such as arms, and engineer, medical, ordnance, quartermaster, and signal equipment, including motorized and animal-drawn vehicles. Delivery is made on the same basis as that described for Class I supplies.

Class III. Motor fuels and lubricants (air and ground).

Class IV. Those articles of supply which are not covered in *Tables of Allowances* and the demands for which are directly related to the operations contemplated or in progress, such as fortification materials, construction materials, and machinery. These supplies are furnished on a requisition basis as Class II supplies.

Class V. Ammunition.

Definitions. An understanding of the terms defined below is necessary for the further study of the system of supply.

Theater of war. Areas of land and sea which are or may become directly involved in the operations of war. The part of this area under the control of each belligerent is usually divided into a zone of the interior and one or more theaters of operation.

Zone of the interior. That part of the national territory not included in the theater of operations. The functions of the several agencies of the zone of the interior, in time of war, are to supply the commander of the field forces with the means necessary for the accomplishment of his mission.

Theater of operations. That part of the theater of war in which operations are conducted. It is divided for the purposes of combat and for decentralization of administration into a communications zone and a combat zone (see plate 1).

Communications zone. That portion of the theater of operations containing the principal establishments of supply and evacuation, lines of communication, and other agencies required for the continuous service of the forces in the theater of operations.

Combat zone. The forward area of the theater of operations. Each army, corps, and division area covers the zone of operations of the unit to which it pertains and is under the control of the commander thereof.

Automatic supply. A process of supply under which deliveries of specific kinds and quantities of supplies are moved in accordance with a predetermined schedule. *Daily automatic supply* means that certain supplies are dispatched daily to an organization. Rations are usually delivered in this manner. The daily telegram is the basis for determining quantities to be delivered.

Daily telegram. A report of strength made by a division or higher unit which serves to determine the unit's daily requirements of Class I supplies.

Credit. An allocation of a definite quantity of supplies, placed at the disposal of the commander of an organization for a prescribed period of time, on which he may draw as required. The amount of the credit is an important factor in determining the extent of operations in which a unit may engage. It is futile to undertake an extensive military operation unless the required supplies in the form of credits are available to draw upon as needed.

Requisition. An authoritative, original demand for supplies required. The quantity called for in a requisition should be considered in connection with the credits and future requirements.

Call or draft. A demand for the delivery of supplies under the terms of a credit.

Priorities. Definite rulings which establish, in the order of time, the precedence of shipments and the movements of rail, road, and water transport. Ammunition, for example, may be forwarded ahead of all other supplies because of the urgency of tactical requirements.

Day of supply. A yardstick used by the higher echelons of the staff for determining levels, credits, and transportation requirements. It expresses collectively, in pounds per man per day, the estimated average expenditure of the various items of supply, per day, in campaign.¹ The amounts are determined by experience, the size and composition of the forces involved, the character of the operations, the nature of the enemy, and prevailing climatic conditions.

¹ According to newspaper accounts of the movement of the British Army to France at the beginning of World War II, it was necessary to move $\frac{1}{2}$ -ton per man per day across the channel to serve the expected requirements of the expedition.

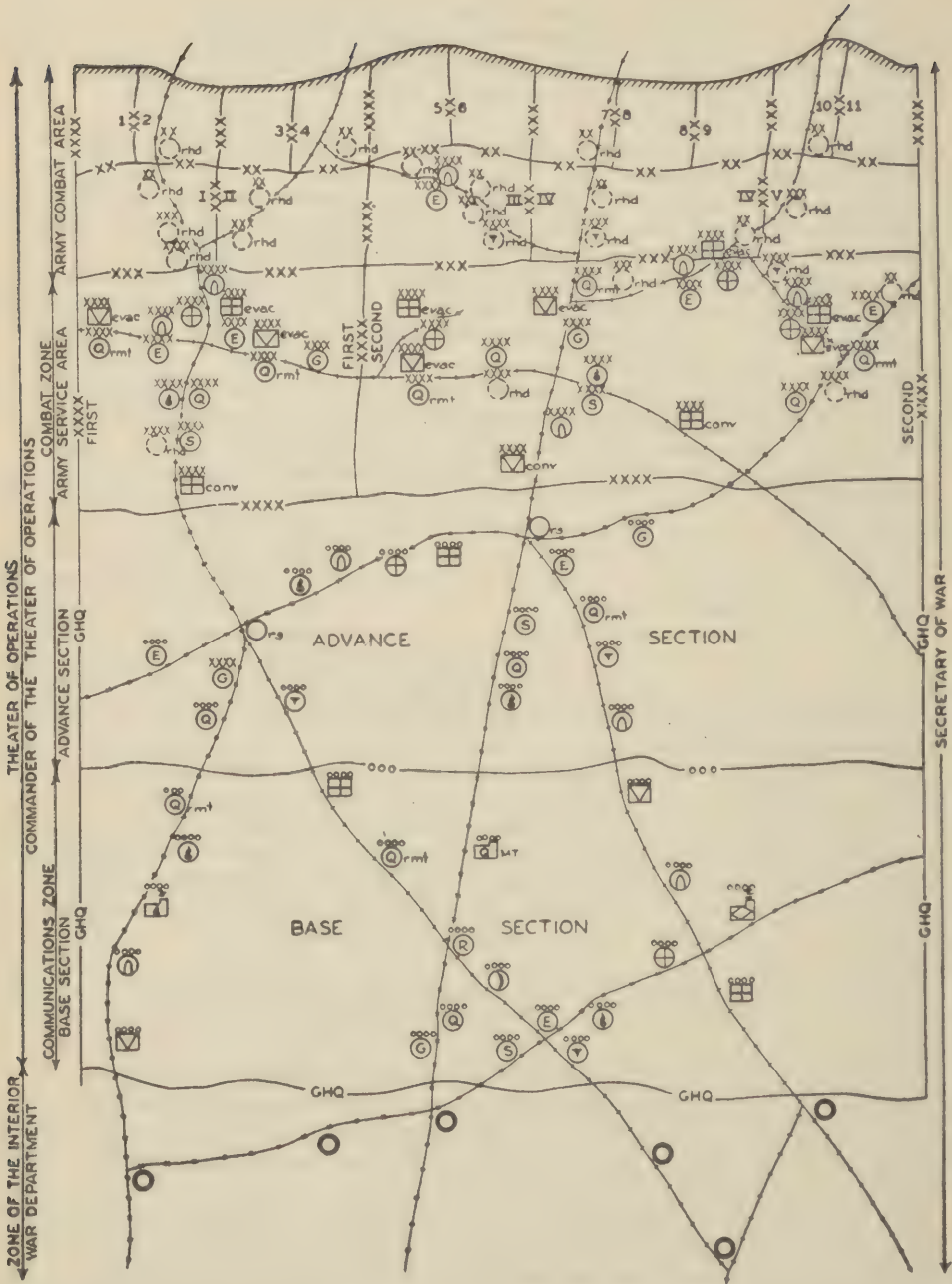


Plate 1. Schematic Diagram of the Organization for Supply in a Theater of Operations.

Day of fire. An arbitrary unit of measure for ammunition expenditure expressed in rounds per piece. The character of the operations is the basis of this estimate. It is subject to change according to experience.

Depots and depot classifications. A depot is an establishment for the reception, storage, classification, issue, or salvage of supplies or for the reception, classification, and forwarding of replacements. The designation of a depot is that of the unit establishing it, followed by the kind of supplies stocked. For example: "First Army Ammunition Depot No. 1"; "Communications Zone General Depot No. 3"; "First Army Replacement Depot".

A *general depot* affords accommodations for the operation of two or more supply arms or services. A *branch depot* pertains to a single supply arm or service. General or branch depots may be *base*, *intermediate*, or *advance depots*, depending upon their location in the communications zone. *Army depots* are branch depots located in the combat zone under the jurisdiction of the army. A corps operating independently will usually find it necessary to establish branch depots similar to army depots; these are designated *corps depots*.

Regulating station. This is a traffic-control agency established on the lines of communication through which movements of supplies are directed and controlled by the commander of the theater of operations. Usually, one is provided for each army or similar command. In an emergency, motor transportation will supplement rail transportation, and the regulating officer must be prepared to substitute motor service if rail transport is disrupted.

Lines of communication. These include the network of railways, waterways, and roads which lead into the combat zone from the supply and evacuation establishments located in the communications zone and the zone of the interior.

Railhead. A point on a railway, designated as such, which provides rail accommodations for the supply of troops whom it is designated to serve. It marks the forward limit of rail transportation within the combat zone. It must be located convenient to the troops served, beyond the maximum effective range of enemy artillery, and have sufficient siding capacity to accommodate at least one unit section of the daily train. Generally not more than two divisions, or one division and corps troops, should be served from any one railhead. *Truck head* and *navigation head* are similar terms.

Daily train. The railway train arriving daily at the railhead with Class I and other supplies for the troops whom the railhead serves. A *unit section* is made up for each division. It is dispatched from the regulating station. It should arrive at or before midnight to allow time for unloading and delivery under the cover of darkness.

Supply point. A generic term used to include depots, railheads, distributing points, air bases, and dumps. The term "refilling point" is no longer in use.

Distributing point. A place at which supplies are distributed to trains of the troops. Separate distributing points are usually established for Class I supplies and small-arms ammunition. Distributing points for other supplies, such as artillery ammunition, water, and engineer supplies, are established as required. Distributing points for Class I supplies, water, and small-arms ammunition must be convenient to the troops served but should be beyond the range of hostile small arms in a location with concealment and cover.

Dump. A temporary stockage of supplies within the area of corps, divisions, or smaller units. Dumps are designated by the identity of the unit establishing them and the class of supplies therein; such as, "1st Infantry Ammunition Dump" or "1st Division Class I Supply Dump."

Control point. An agency established by a unit at a convenient point on the route of its trains where information and instructions are given and received to facilitate and regulate supply.

Train. The train of a unit is that portion of the unit's transportation with its accompanying personnel which operates under the immediate orders of the unit commander in supply, evacuation, and maintenance. The designation of a train is the same as that of the unit, as "1st Infantry Train." A train may be subdivided according

to the service in which it is engaged; for example, "Ammunition Train, 1st Infantry," "Kitchen Train, 1st Battalion, 1st Infantry," or "Medical Train, 1st Battalion, 1st Field Artillery."

Straggler line. A line usually located close in rear of the light artillery positions along well defined terrain features. On or in rear of this line military police are stationed to apprehend stragglers moving to the rear. A *straggler collecting point* is a location on the straggler line at a place which is likely to be used by stragglers. They are returned to their organizations from this point.

Prisoner of war collecting points. A place where prisoners of war are delivered by organization guards and turned over to the military police for custody.

Prisoner of war enclosure. A place for safe-keeping and confinement of prisoners of war pending their evacuation to the rear.

Traffic control post. A critical point on a highway at which one or more men are stationed to regulate traffic.

Traffic patrol. One or more men mounted on horses, bicycles, or motorcycles for the purpose of patrolling roads between traffic control posts.

Officers' control station. One or more officers and a detachment of military police detailed to control and regulate traffic within a critical area, such as a town, defile, or multiple road intersection, where immediate action by a responsible authority is necessary.

Evacuation. The process of clearing the combat zone of battle casualties in both men and animals.

Collecting station. A place at which casualties are assembled from unit aid stations, frequently by litter carry, where they are examined, given the necessary treatment, fed, and sorted for return to their units or removal to the hospital station (or clearing station). Its distance from the front line will usually vary from 1500-3500 yards. It should be on the natural line of drift of wounded, be protected from hostile small-arms fire and observation, and on a practicable ambulance route. Water, wood, and shelter should be available.

Clearing station. The division medical installation where sick and wounded are assembled from collecting stations, sorted, treated if necessary, and turned over to the army for further evacuation. (Formerly called "hospital station.")

Evacuation hospital. A hospital through which all casualties pass in their transit from the combat zone to the communications zone. They are established in groups of two or more behind each corps at from 10-16 miles in rear of the battle front along railroads leading to the communication zone hospitals and along roads which lead forward to the division areas. Casualties are moved by ambulance from the hospital stations of divisions to the evacuation hospital.

Surgical hospital. A hospital assigned to the immediate support of division hospitals, from which the more serious cases or non-transportable cases are received.

Hospital train. A train which is specially equipped and supplied for the purpose of moving patients from evacuation hospitals to the communications zone.

Reserve supplies. Supplies which are accumulated in depots in excess of immediate needs for the purpose of insuring continuity of an adequate supply under any condition of campaign. The stockage of depots for future needs and the level of supplies of all categories to be maintained are important questions of decision. These supplies are classified as *base, battle, unit, and individual*.

Base reserves. Supplies accumulated and stored in depots, for the purpose of establishing a general reserve, under the control of the commander of the theater, for the theater of operations as a whole.

Battle reserves. Supplies accumulated in the vicinity of the battlefield in addition to unit and individual reserves. They are often accumulated in anticipation of a particular operation. If these supplies are left on freight cars so as to be quickly moved they are sometimes referred to as *rolling reserves*.

Unit reserves. The prescribed quantities of supplies carried as a reserve by a unit. Unit reserves of rations, ammunition, and gasoline are maintained as regular procedure. They insure supply during minor emergencies when for any reason the supply service is interrupted.

Individual reserves. Supplies carried on the soldier, animal, or vehicle for his or its individual use in an emergency.

"Rolling" reserves. The prescribed load of supplies carried on trains of the corps, division, and subordinate units. These supplies may be placed in dumps to obtain release of transportation for other purposes. Also reserves stocked on railway trains.

The Division as a Link in the Supply System. The division is the basic supply unit for combat troops. The field army is the principal administrative (and supply) unit in the combat zone. The army corps, when part of an army, is not a link in the chain of supply, evacuation, and replacements for its division except requisitions for and allocations of ammunition and personnel. In accordance with the principle that each commander is responsible for the supply of the components of his force, the impetus coming from the rear, the division receives and distributes the supplies which are forwarded to it by the supply agencies under the control of the field army commander. Plate 1 illustrates in diagram the location and nature of these supply agencies. The division commander is responsible for the administration, supply, and evacuation of his force to the same extent as for its action in battle.

The delivery and distribution of supplies within a division whose trains are motorized are effected by hauling either in regimental or divisional transportation from army supply points to the using troops. Normally, supplies are not transferred to other trucks or placed in dumps from the time they are received from the army supply points until they are delivered to the using troops. Based upon consideration of the tactical situation, the reserves carried, the probable expenditure rate, the distances involved, the routes available, and the restrictions imposed by higher authority, the division commander determines the degree of responsibility that will be placed on subordinate commanders for effecting resupply with their own transportation. The division commander must insure that the requirements placed on subordinate units for the utilization of their transportation in effecting resupply are not excessive. That part of the hauling requirement which is not delegated to subordinate commanders must be executed by transportation of the division quartermaster battalion or quartermaster regiment (in the square type division). On the other hand, the transportation of the division quartermaster unit constitutes the division reserve, which is inadequate to meet in full the requirements for resupply of the division during a protracted period. The reader should understand that the division commander may prescribe that subordinate commanders will provide for resupply with their own unit train; or that resupply will be handled in its entirety by trucks of the division quartermaster unit; or that it may be done by unit trains, in part, and by the quartermaster unit, in part.

Pooling of Truck Transportation. While certain trucks are assigned prescribed loads, it does not follow that their use is limited to transporting such loads. Except for motor vehicles issued as an aid to the movement of active weapons, such as prime movers or weapon carriers, all of the trucks of a unit are considered by commanders as a pool of transportation to be used as required. By this means maximum flexibility and capacity are obtained.

Replenishment of Gasoline and Oil. The modern military force of large size requires huge quantities of gasoline and oil. It is obvious that the consumption rate per day must vary within the widest limits, depending upon distances moved, distance to supply points, and the total truck-miles of transportation required. Accordingly, no fixed quantity can be specified as a day of consumption of a unit.

A reserve of gasoline and oil in containers is carried in each unit. As far as practicable, initial distribution of this reserve is made to each vehicle. This constitutes the entire division reserve. Each vehicle sent to an army supply point replenishes its supply en route at some convenient gasoline supply point established by the army. Vehicles remaining in the forward areas are resupplied by exchanging empty containers for full ones brought forward by regimental or divisional transportation.

Procedure to Obtain Class I Supplies (Rations, Forage, and Illuminants). The following rations are prescribed for field service (Circular 88, War Department, November 7, 1939).

Field Ration A: Corresponds to the garrison ration and is perishable.

Field Ration B: Same as A but with nonperishable components.

Field Ration C: Previously cooked ration; 6 cans per individual ration, 3 of meat and vegetables, and 3 of crackers, sugar, and coffee.

Field Ration D: Three 4-ounce chocolate bars per individual ration.

The A ration will normally be issued daily from Class I railheads to all divisions and other units not actively engaged with the enemy. In battle, one of the nonperishable rations or combinations will usually be issued to the units engaged.

Class I supplies are usually furnished on an automatic basis. Daily strength reports are submitted by each company and battery to the regiment where they are consolidated and forwarded to the division headquarters. The sum of these reports is the strength of the division and is the number of officers and men, and animals, for whom Class I supplies are to be received.

The division quartermaster prepares and sends a daily telegram stating the strength to the army quartermaster. This information from all the components of the army is then furnished by telegram to the quartermaster supply officer at the regulating station. This officer notifies the appropriate depots in the communication zone or zone of the interior to forward the required supplies.

The depots make up the required shipment as required, based solely on the strength reports, forwarding ration components and other Class I supplies according to definite schedules. It is noteworthy that mess officers in the field have no choice whatever of the ration components they will receive; rations are sent forward sufficient for the number of men reported in the strength report. Balancing the diet and variations in the ration components are determined at the point of origin of the shipment. The shipment starts forward, usually by rail, from the depot and passes through the regulating station en route to its final destination.

At the regulating station cars are assembled into unit sections, one section, for example, being made up for each division. This section becomes the daily train. It is dispatched from the regulating station in time to permit arrival at the division railhead at a pre-arranged hour. This time of arrival is usually after dark and before midnight so that the train can be unloaded and the supplies distributed to the troops before daylight.

At the railhead the daily train is unloaded and the supplies are distributed by the division quartermaster service. This may be accomplished by different methods. *Unit distribution* consists of loading the supplies for a unit, a regiment for example, on trucks of the division train; they are then hauled to the distributing points for Class I supplies established for the particular units concerned. A brigade of infantry may secure its supplies from the same distributing point, which is usually located at the bivouac of the unit trains. At each distributing point the trucks are unloaded, the supplies separated for each subordinate unit such as a company and loaded into trucks of the unit train for final delivery. Rations are sent directly to the kitchen sections. *Railhead distribution* is a second method. In this method the railhead becomes the distributing point and supplies are not moved in trucks of the division train. The supplies are unloaded at the railhead, separated into loads for each subordinate unit, and secured at that point by the unit trains. Delivery to the troops is then accomplished. Combinations of these methods may be used, some subordinate units being supplied by unit distribution while others use railhead distribution. The distance of the railhead from the troops and the availability of transportation are determining factors in the selection of method.

Reserve Stockage of Supplies. The ideal flow of supplies, if it were possible of attainment, would place in the hands of troops today the things they will consume today. With such an arrangement the slightest interruption or miscalculation would result in immediate shortages with the troops. A reserve of supplies is necessary to provide against interruption in delivery, such as might result from enemy bombing operations, and to provide available supplies in quantities beyond the hauling capacity of a unit during an operation.

The quantities of supplies held in reserve stockage depends upon the nature and extent of the proposed tactical operation, the capabilities of the enemy to interrupt the

normal bow of supplies, the distance to supply depots, and other factors. The amount and kind of reserve supplies are decisions to be made by the commander. If too little a reserve is maintained hardship may result, as a minimum, and disaster as a maximum. On the other hand, if too great quantities are stocked the unit loses flexibility in movement, excessive manpower is consumed in loading and unloading vehicles, and in the event of a sudden withdrawal under hostile pressure large quantities of valuable stores must either be destroyed or abandoned to the enemy.

The ration reserve to be carried by individuals and on unit trains as a prescribed load is announced by the division commander. The rations within a division would rarely exceed three in number. For example: one ration issued to the kitchens with which to prepare the next three meals, one ration in reserve, transported on unit trains; and one ration retained under the control of the division quartermaster.

The reserve of gasoline and oil, as discussed above, is carried by each vehicle in extra cans.

The reserve of ammunition is provided by issue of complete loads to combat units and vehicles, by dumping of loads of certain ammunition-carrying vehicles in areas convenient to combat units, and the return of these vehicles thus emptied to army supply points for additional quantities.

The problem of estimating the kind and quantity of supplies required for an extensive operation of a large force is a responsibility of the commander. He must reach the decision by a far-sighted analysis of all the factors which may confront his subordinate units.

The supply of small-arms ammunition is a responsibility of the division ordnance officer. Using transportation and labor from the division quartermaster regiment or battalion, ammunition is obtained from supply points established by the army or independent corps. It is then transported to small-arms ammunition distributing points, usually established in rear of each brigade and conveniently located with respect to the positions of troops. The trains of units secure loads at these points as they are required. Units with motorized trains may secure ammunition direct from the supply point. Issue of ammunition to the troops becomes a responsibility of regimental commanders as soon as it has been turned over to them at the distributing points. This phase of delivery is a function of battalion or regimental supply sections.

Supply of artillery ammunition is a direct responsibility of the commander of the division artillery. He has an ammunition train for the purpose. Ammunition is obtained from artillery ammunition supply points which are established by the army or independent corps. It may be delivered direct to the batteries, or distributing points may be established in convenient locations where unit trains obtain it as required.

Anticipation of quantities of ammunition required for a projected operation is a vital consideration. Battle reserves may be built up in anticipation of peak needs at depots and at supply points. Extra ammunition may be issued to the troops, ammunition carrying vehicles may dump their loads in convenient locations and then be refilled. Foresight is required to anticipate the requirements and to provide the necessary stockage in advance depots so that delivery to the troops may be accomplished rapidly. In this phase of planning considerable use is made of the units established by the *day of fire* and *day of supply* of ammunition and other supply requirements, respectively. While these computations are valuable chiefly in determining tonnage, depot capacities, and number of trains required, they are important for large units. These figures are subject to constant revision to accord with experience.

Procedure to Obtain Other Supplies. Other supplies are obtained on approved requisition through unit supply officers. Heads of supply services of the division either fill the requisition from their own restricted stockage or forward it to higher headquarters. After approval, the requisition is then sent to the appropriate depot or supply point where it is handled by the unit concerned. *Engineer distributing points* may be established in locations convenient to the troops for distribution of large quantities of tools or materials. Medical supplies are procured by the service company of the medical regiment or battalion from medical depots of higher echelons and distributed to medical units, including

attached medical personnel with the regiments. Water, where practicable, is obtained locally and chlorinated as a matter of protection. Whenever necessary because of inadequate local supplies of potable water, *water distributing points* are established and operated by the division engineer regiment or battalion. From these points water containers of units of the division are filled.

Reinforcing units to the division are supplied by the division, responsibility resting upon the division commander to the same extent as for his organic components.

Procedure for Evacuation of Casualties. Casualties are first assembled at *aid stations* of the regiment or battalion, by litter if necessary, by medical personnel attached to regiments. From the aid stations, after the administration of the immediate requirements of medical care, they are transported to *collecting stations* by litter, by ambulance, or by walking. From the collecting stations they are moved by ambulance to the division clearing station. Division clearing stations are evacuated (cleared of patients) by medical units of the army of the independent corps.

CHAPTER VIII

LEADERSHIP¹

The Individual in War. Man is the fundamental instrument in war; other instruments may change but he remains a constant factor. Unless his behavior and elemental attributes are understood, gross mistakes will be made in planning operations and in troop leading.

The *conduct* of the average man in battle is governed more by instinct than by reason. By instinct he is gregarious and prefers to fight in the group. He is beset with fear of the unknown, especially at night and when alone, and therefore seeks security in the group. He readily accepts symbolic ideals implanted by tradition and national culture and will fight for these ideals when he is aroused. His instinct of self-preservation will induce him to flee from danger but he is deterred from flight by the disgrace he feels in the eyes of his comrades. He wants to earn their respect and esteem as measured by the standard of military conduct accepted by the group. In the training of the individual soldier, the essential considerations, therefore, are to integrate the individual into a group and to establish for that group a high standard of military conduct and performance of duty.

War places a severe test on the *moral stamina* and *physical endurance* of the individual. It is not sufficient that he be well armed and equipped. Not only must the individual soldier be physically hardened, but he must be qualified to march, to use his weapons, and to care for himself and his transportation in the field.

The individual soldier must be fortified by *discipline* which is based on a high ideal of military conduct. This discipline must cause every man to have a horror of the disgrace that will be visited upon him and his unit if he succumbs to fear and endangers his comrades. An endeavor to dominate the instinct of self-preservation by the fear of a greater terror is resorted to only in extreme cases and then primarily for its salutary effect on the members of the group. As a rule it is far better to dominate demoralizing influences by inculcating in the individual a proper sense of duty, a conscious pride in his unit, and a feeling of mutual obligation to his comrades in the group.

In spite of the advances in technique, the worth of the *individual* man is still decisive. His importance has risen due to the open order of combat. Every individual must be trained to exploit a situation with energy and boldness, imbued with the idea that success will depend upon his action.

The dispersion of troops in battle caused by the influence of modern weapons makes control more and more difficult. Modern combat, therefore, requires more than ever a strong cohesion within a unit in order to give it a *sense of unity*. This cohesion is promoted by good leadership, pride in the accomplishments and reputation of the unit, and by mutual confidence and comradeship among its members.

Troop Leading. *Troop leading* in combat, regardless of the echelon of command, calls for cool and thoughtful leaders with a strong feeling of the great responsibility imposed upon them. They must be resolute and self-reliant in their decisions, energetic and insistent in execution, and unperturbed by the fluctuations of combat.

Example of Leadership. Troops are strongly influenced by the example and conduct of their commissioned and noncommissioned leaders. Will power, self-confidence, initiative and disregard of self will enable a leader to master the most difficult situation. A bold and determined leader will carry his troops with him no matter how difficult the enterprise. Mutual confidence between the leader and his men is the surest basis of discipline in an emergency. To gain this confidence, the leader must find the way to the hearts of his men. This he will do by acquiring an understanding of their thoughts and feelings, and by showing a constant concern for their comfort and welfare.

Combat Value of Units. The *combat value* of a unit is determined by the soldierly qualities of its leader and members and its "will to fight." An outward mark of this combat value will be found in the set-up and appearance of the men, in the condition, care, and maintenance of their weapons and equipment, and in the readiness of the

¹The Officers' Guide, Military Service Publishing Company, has abundant material on this subject.

unit for action. Superior combat value will offset numerical inferiority. The greater the combat value of the troops, the more powerful will be the blow struck by the commander. Superior leadership combined with superior combat value of troops constitutes a reliable basis for success in battle.

Importance of Discipline. A hastily or poorly trained unit is likely to fail in a critical moment due to demoralizing impressions caused by unexpected events in combat. This is particularly true in the first engagements of a unit. Therefore, training and discipline are of great importance. Every leader is obliged to take energetic action against indiscipline, panic, pillage, and other disruptive influences. *Discipline* is the cohesive force that binds the members of a unit and its strict enforcement is a benefit for all. Its constraint must be felt not so much in the fear of punishment which it evokes as in the moral obligation it imposes on the individual to heed the common interest of the group.

Relations of the Commander with His Troops. A commander must live with his troops, and share their dangers and privations as well as their joys and sorrows. By personal observation and experience he will then be able to judge their needs and combat value. A commander who unnecessarily taxes the endurance of his troops will only penalize himself. The expenditure of combat strength must be in proportion to the

ESSENTIALS OF TROOP LEADING

1. Ability to reach a logical decision and sound plan. (Estimate of the Situation.)
2. Ability to transmit his decision and plan to his subordinates in the form of clear and simply expressed orders. (Issue of orders.)
3. Possession of the strength of character and knowledge of human relationships to force the execution of his orders. (Supervision.)

objective to be attained. Impossible demands only undermine the morale of troops and destroy their confidence in the leader.

Comradeship among officers and men is to be fostered by every available means. The strong and the capable must encourage and lead the weak and less experienced. On such a foundation, a feeling of true comradeship will become firmly established and the full combat value of the troops will be made available to the higher commander.

Acceptance of Responsibility. A willingness to accept *responsibility* is the foremost trait of leadership. This willingness should not, however, manifest itself in a disregard of orders on the grounds of probably having a better knowledge of the situation than the higher commander. Independence must not be confused with personal caprice.

Officers and men of all grades are expected to exercise a certain independence in the execution of tasks assigned to them and to show initiative in meeting situations as they arise. *Every individual from the highest commander to the lowest private must always remember that inaction and neglect of opportunities will warrant more severe censure than an error of judgment in the choice of the means.*

Morale and Unity. A wise and capable commander will see that the men assigned to the component groups of his unit are compatible and the composition of the groups is changed as little as possible. He will provide each group with a leader in whom its members have confidence. He will so regulate the interior economy of the unit that all groups perform the same amount of work and enjoy the same amount of leisure. He will see that demonstrated efficiency is promptly recognized and rewarded. He will set before all a high standard of military conduct and apply to all the same rules of discipline.

Good morale and a sense of unity in a command cannot be improvised; they must be thoroughly planned and systematically promoted. They are born of just and fair treatment, a constant concern for the soldier's welfare, thorough training in basic duties,

comradeship among men, and pride in self, organization, and country. The establishment and maintenance of good morale are incumbent upon every commander and are marks of good leadership.

The Decision. All commanders must reach their decisions by a logical process of thought. The process is called the "estimate of the situation." Prior to contact, or the beginning of a planned operation to be executed at a later time, there may be opportunity for a lengthy, time-consuming, painstaking analysis in which is considered all of the factors which can affect the outcome. A commander will compare each possible action which he can adopt, within the sphere of his mission, with each enemy reaction. Finally he will arrive at his decision which will include *what* the command as a whole will do, *when*, *where*, and *how* it will do it. Illustrative of a decision is the following: "To attack without delay enveloping the hostile south flank from the vicinity of Jonesville to seize the high ground east of Smithton.

"Line of departure: Highway 22.

"Boundary between brigades: * * * * *

There is no room for vacillation, for hunches, for "snap" judgment. All of the factors must be determined, weighed, analyzed, and accepted or rejected. It culminates in the decision.

In the heat of battle, commanders will rarely have time for such a detailed process prior to announcing the action to be taken. But the necessity for a thorough estimate is in no way reduced. Under these conditions each officer and man "lives" with the situation. The commander must be aware of the location and situation of his units. He must obtain and evaluate information of the enemy. He must be alert to each possible hostile threat and eager to exploit each enemy weakness. Foreseeing all possibilities he must have in mind tentative plans in constant development to meet each change in the situation. Under these conditions the announcement of a decision and plan to meet a sudden threat or exploit an opportunity is a matter of a brief period, perhaps a few minutes, even a few seconds. See Chapter VII, Part III.

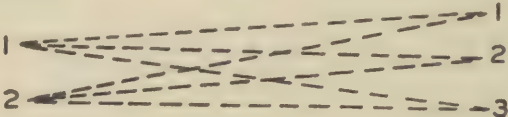
The Plan. After the commander has reached his decision he must evolve the plan by which it is to be executed. It will direct the essential tactical operations to be undertaken and make disposition of the major combat elements. It includes the basic tactical decision, supplementary decisions regarding unit tactical missions, intelligence and security measures, and administrative matters necessary to give effect to the decision. Definite missions are assigned to the principal components of the force. In an attack, for example, the plan may include the designation of the units to make the holding attack, the main attack, and the reserve with its initial location. Many other details may be included, depending upon the desires of the commander, the state of training of the troops, the skill of his staff and subordinate commanders, and the degree of teamwork which has been developed between the components of the force.

The commander who has no staff must of necessity prepare all of its details. But when a trained staff is available he may utilize it to develop it in final and complete form. When this process is followed the commander issues a directive to the staff, or to his chief of staff, in which he states the decision and outline of his plan. The staff will then complete it and, subject to approval of the commander, prepare and issue orders to the components of the force.

Orders. The will of the commander as expressed in his decision and completed plan is transmitted to subordinate commanders in the form of orders. They may be issued as written field orders, they may be dictated to the subordinate commanders of principal units, issued orally, in complete form or fragmentary form. Whatever the method of issue, there are two requirements which must be met: *First*, they must reach the subordinate commanders, even of the smallest units, in time for them to make their own reconnaissance, their plans, issue their orders, and place their units in the required positions; *second*, they must be so clearly expressed as to eliminate any chance of misunderstanding or confusion.

Under many conditions of combat, especially where speed in execution is required, time may be saved by having the phases of planning and execution proceed simultaneously, each step being started as soon as it is decided upon. It may start, for example,

THE LOGICAL BASIS OF
THE COMMANDER'S ESTIMATE OF THE SITUATION

Par. 1 OBJECT	With the MISSION as the guiding consideration
Par. 2 CALCULATION	Estimation and Calculations of the CONSTANT FACTORS of the situation (Relative Combat Power, Time and Space, Terrain, etc.) in combination with all appropriate methods of TACTICAL ACTION leads to DEDUCTION of their EFFECT (preventing, hindering, favoring) to LIMIT the ACTION of the VARIABLE FACTORS YOUR FORCE To all reasonable and practic- able lines of action open to you to accomplish your mis- sion. (1, 2, etc.) ENEMY FORCE To all physical capabilities of the enemy to hinder the ac- complishment of your mission. (1, 2, 3, etc.)
Par. 3 VISUALIZATION	ANALYSIS of the lines of action and capabilities of the VARIABLES (WHAT WILL HAPPEN IF) OWN LINES OF ACTION OPPOSED BY ENEMY CAPABILITIES  etc. Leads to determination of the ADVANTAGES & DISADVANTAGES of your own lines of action.
Par. 4 SELECTION	COMPARISON of the advantages and disadvantages of your OWN LINES OF ACTION leads to
Par. 5 DECISION	DECISION

with a warning order that the command will attack. As soon as units are designated for the holding attack, main attack, and reserve they may move to attack positions. Thus at times it is practicable to start the execution of a plan before all of its final details have been determined.

Clarity in expression is extremely important. There is no known substitute for simple, clearly expressed, concise, grammatical English. Verbosity, omission of essential details, use of "canned language" which may not be clear to the reader, with words or phrases capable of double meanings, are each to be studiously avoided.

The form and contents of orders must also be tempered by the personalities of the subordinates who are to execute them. To an aggressive, skillful, dependable leader, mission type orders may be given which leave to the subordinate great latitude in the selection of method. Such methods are appropriate within organizations which have developed mutual understanding by long association in combat. We may forget, in impersonal studies, that individuals are something far more than identical machines; they are men, all are different, and relationships must be based upon full appreciation of these human equations. General Lee achieved his greatest successes by skill in this very factor. At Chancellorsville his orders are military models for he was supported by Jackson, a corps commander who reached his greatest effectiveness when allowed latitude in deciding his actions in detail. But at Gettysburg, Lee may have suffered his greatest failure for allowing others of his subordinates to function under the same type order which worked so well with the [by then] deceased Jackson. Stuart with Lee's cavalry failed to maintain contact with the main force; this denied Lee the information on which he depended. Ewell failed to exploit a success by misinterpreting an order. Longstreet delayed the execution of two attacks either by misunderstanding, inability to dispose his forces in time, or willful disobedience. In any event, there was a lack of clear-cut orders suitable for the personalities with which he dealt, however adequate they might have been for Jackson. An order "which can be misunderstood will be misunderstood."

Supervision of Execution. The commander will fail who lacks the strength of character, the courage, the energy to supervise the execution of his orders, bending and altering them to meet new situations, directing and leading his men in the execution of the mission. It requires contact with his subordinate commanders at which time he may confer with them, explain his desires, hear their reactions, adjust conflicts, watch the execution. He must see with his own eyes the work of his men, even in advanced positions, so that he may know their problems and supply their needs. *In this process he must be seen by his men.* They must know their commander, recognize him, be convinced that he knows their situation and will take prompt action to aid them in their hazardous undertakings. It cannot be done from a command post. Nor can it be done through visits of inspectors or staff officers or by any other impersonal process. This is a task which must be executed by the commander in person. The great military leaders of history have been masters of this phase of the art of leadership. Each visit must reinforce their morale, their confidence, their willingness to accept sacrifice. Repeated time and again the day may come when the commander is given the personal respect of his men which may later develop into admiration, even to love. When that spirit is developed the force which he commands can sustain reverses and, having sustained them, can still go forward and win victories.

The size, complex nature, and speed of operation of the modern military unit make it difficult to control. The commander is likely to be unduly tempted to remain at the command post, to supervise each step in the work of his staff, to inform himself of each minor change in the situation. While his responsibility includes all of these matters, even the most trivial, he cannot permit himself to be separated from his greater responsibilities. He must surround himself with subordinate commanders and staff officers in whom he has confidence, who are able to execute this multitude of details, even important ones, in a manner which will obtain the required results. As time passes this desirable state is enhanced by training, by shift of personnel, and adjustment of methods. Finally unity of effort, coordination, mutual trust, and respect may each be developed. When that time comes the commander is free to exercise the personal control and leadership on which the success of military operations is based.

CHAPTER IX

DEFENSE AGAINST CHEMICAL WARFARE

GENERAL CONSIDERATIONS

The Medical Officer and Chemical Warfare. The use of chemicals in warfare presents a problem of peculiar importance to members of the Medical Department. Theirs is the task of treating and evacuating gas casualties, in itself a dangerous task. They are as subject to becoming gas casualties while in the execution of their mission, except for advanced infantry units, as other arms and services. Hence, the medical officer requires a considerable knowledge of the chemicals used in war to execute his professional responsibilities, and he will need this knowledge in order to instruct the soldiers under his control for their own protection. All personnel present in an area where chemicals are employed are equally subject to its hazards.

The medical aspects of chemical warfare are presented in Chapter VIII, Part II, of this volume.

Chemical Warfare Defined. Chemical warfare is the tactical employment of substances which are capable, after their release in the field, of acting directly through their chemical properties to cause bodily injury or irritation, produce an obscuring smoke, or set fire to combustible material. Such substances are called chemical agents. The munitions employed to disseminate them are referred to as chemical weapons. Chemical agents, employed for their physiological effect, generally are disseminated in the form of gas which renders the atmosphere at the target dangerous to breathe and necessitates the use of gas masks or other protective equipment.

Origin of Chemical Warfare. Crude devices for generating noxious fumes to wear down the resistance of an enemy were employed in sieges by the ancient Greeks as far back as the 5th Century B.C. Such means continued to be used against walled cities until well into the Middle Ages. But as warfare became more open, these primitive devices, being no longer of general value, fell into disuse. The employment of incendiary substances in war is considered by many military historians to be as old as organized warfare. The deliberate use of screening smoke as an aid in battle is largely a recent addition to military art, although history records some instances of its employment in early times. In essence then, chemical warfare is not new. However, as an application to war of modern science and industry, it was inaugurated in the World War.

World War Development. Modern chemical warfare dates from April 22, 1915, when the Germans carried out an attack with chlorine gas against the Allies in Flanders. For this attack the Germans emplaced thousands of cylinders of liquefied chlorine in their front-line trenches. When the valves were opened the chlorine vaporized as it was released, forming a gigantic, suffocating cloud which was swept by a favorable wind for several miles before the gas was finally dissipated. Some 20,000 casualties resulted. The Allies were soon to retaliate and from then on until the close of the war gases, smokes and incendiary materials came to be used extensively. The cylinder attack gave way largely to the use of projectiles to release chemicals directly upon the target, thus making chemical operations less dependent upon wind conditions. Chlorine was soon superseded by more deadly gases, notably phosgene. In 1917 the Germans introduced dichloro-ethyl sulphide, a skin blistering substance, given the name mustard gas by British soldiers. It caused more casualties than all other types of gases used.

Hand in hand with offensive developments came the provision of gas masks and other protective means. While these were constantly improved as the war progressed, gas, nevertheless, caused a tremendous number of casualties although comparatively few cases were fatal. More than one-fourth of the battle casualties of the American forces engaged in the war were due to gas. Among the immeasurable difficulties imposed by gas attacks were the interruption of normal activities, lowering of morale, and extra work in providing gas shelters and cleaning contaminated installations and equipment.

In pursuit of means for chemical warfare, each belligerent set up an elaborate research

and development. In addition to the extensive use of artillery for chemical operations, separate tactical units of troops armed with special chemical weapons were provided.

Development Since World War. Aircraft were not used in the World War as a means of delivering gas attacks. But gas bombs and devices for use on airplanes to spray liquid chemicals have since been developed, so that gas attack from the air is now recognized as highly practicable. Another post World War development is the improvement of chemical mortars which, with motor transportation, make possible the conduct of chemical operations of considerable magnitude by ground forces in open warfare. There unquestionably has been much improvement since the World War in gas protection. However, if gas is employed in future war, the utmost precautions against surprise and a high state of gas discipline will be required.

Treaty Prohibitions of Toxic Gas. The resort to toxic gas in the World War was generally condemned by the Allies as a violation of certain provisions of The Hague Convention of 1899 on rules of warfare. Accordingly, the Peace Treaty of Versailles, and a number of subsequent treaties, contain clauses amplifying The Hague rules more to definitely prohibit toxic gas as a weapon. None of these treaties, however, has been ratified by all of the military powers. Meanwhile, all such powers have continued to maintain establishments for chemical warfare research, and provision, at least, of gas-protective equipment. General John J. Pershing, in his final report as commander in chief of the American Expeditionary Forces in the World War, sums up tersely the gas-protective problem, stating: "Whether or not gas will be used in future war is a matter of conjecture, but the effect on the unprepared is so deadly that we can never afford to neglect the question."

Objects of Gas Defense Training. The objects of training in gas defense are to minimize casualties and prevent hostile chemical attacks from causing undue interruption to or interference with normal military activities.

Defense is predicated upon knowledge of the weapons which an enemy may employ, their capabilities and limitations, and the methods of their use. In this respect, chemical warfare is no exception. To defend against chemical attack we must not only have special equipment and understand its use, but we must know the characteristics of chemical agents and weapons and how and when they can be employed most effectively.

Responsibility of Commanders. "Organization commanders are responsible for the proper training of their respective commands in defense against chemical attack and, within the means available to them, they are responsible for taking proper measures for the care and maintenance of protective equipment, and for the protection of their troops, equipment and supplies against gas."—*Basic Field Manual, Vol. 1, Chapter 8, Defense Against Chemical Attack, War Department, 1938.*

The Chemical Warfare Service. The Chemical Warfare Service of the American Army was organized in the World War as the result of experiences indicating the need for centralizing chemical warfare activities in a single agency. Following the war, in the revision of the National Defense Act, Congress made provision for this branch as a part of the permanent military establishment. The duties of the Chief of the Chemical Warfare Service, stated in the Act, include chemical warfare research and experimentation, procurement, manufacture, or supply of chemical warfare equipment, and supervision of training in chemical warfare.

This supervised training is conducted through the Chemical Warfare School at Edgewood Arsenal, Md., chemical warfare instructors at other service schools, chemical officers on the staffs of corps area; department and division commanders; and unit gas officers of regiments and battalions of the various arms.

CHEMICAL WARFARE AGENTS AND WEAPONS, AND FORMS OF CHEMICAL ATTACK

Classification of Agents. *a. General.* Chemical agents comprise three classes of substances: gases, smokes and incendiaries.

(1) The term *gas* is here used in a broad sense as applying to a chemical agent which can be disseminated in the air to produce a powerful physiological effect.

(2) A *smoke* is a chemical agent whose principal effect is to produce an obscuring cloud.

(3) An *incendiary* is a chemical agent whose principal purpose is to cause destruction of material by fire.

b. Physical state. Chemical agents may be encountered in gaseous, liquid, or solid form. All chemical agents, brought to the battlefield loaded in explosive shell or other containers, are in either a liquid or solid state. Some of them vaporize at once upon their release, forming gas or smoke clouds; some tend to remain as liquids or solids but vaporize gradually; some require the application of considerable heat for their dissemination and hence are used in burning-type munitions.

c. General types of gases. Gases consist of two principal types, *toxic gases*, or those which may cause severe injury or death, and *irritant gases*, those which may have severe incapacitating effect but, in concentrations which can be produced in the field, will not cause death.

(1) Toxic gases present two distinct types, *nonpersistent* and *persistent*.

(a) A *nonpersistent* gas is one whose effectiveness is dissipated generally within 10 minutes after release. Most agents of this class are true gases which are liquefied under pressure for loading in containers. Upon release they quickly revert to their normal gaseous state.

(b) A *persistent* gas is one whose period of effectiveness extends beyond 10 minutes. Such substances are normally liquids or solids but they vaporize slowly after release.

(2) *Irritant gases* may be persistent or nonpersistent but in their case, persistency depends largely upon the method of dissemination used.

d. Physiological action. Chemical agents are classified according to their most pronounced physiological effects as:

(1) *Lung irritant*, an agent which, when breathed, causes irritation and inflammation of the lungs.

(2) *Vesicant*, an agent which blisters the skin with resultant inflammation, burns, and the destruction of tissue. It also has a corresponding effect upon the lungs and eyes.

(3) *Sternutator* (irritant smoke), an agent which acts upon the mucuous membranes of nose and throat, causing sneezing, coughing, and headache.

(4) *Lacrimator*, an agent which causes a copious flow of tears, and intense, though temporary, eye pains.

Screening smokes, as used in the field, generally have no injurious effects. Incendiary substances, in contact with the body, cause severe heat burns.

e. Tactical use. Chemical agents are further classified according to their tactical use, as:

CLASSIFICATIONS OF CHEMICAL AGENTS

GENERAL TYPE	PERSISTENCY	PHYSIOLOGICAL ACTION	TACTICAL USE	EXAMPLE (Name and Symbol)	NORMAL PHYSICAL STATE
GAS	Nonpersistent	Lung Irritant	Casualty	{Phosgene (CG) Chlorine (CL)}	Gas Gas
		{Vesicant	Casualty	{Mustard Gas (HS) Lewisite (MI)}	Liquid Liquid
	Persistent	Lung Irritant	Casualty	Chlorpicrin (PS)	Liquid
	Depends on means of dissemination	{Sternutator	Harassing	Adamsite (DM)	Solid
		{Lacrimator	Harassing	{Chloracetophenone (CN) Tear Gas Solution (CNS)}	Solid Liquid
SMOKE	Burning or functioning time of the munition	Negligible	Screening	{White Phosphorus (WP) HC Mixture (HC) Sulphur Trioxide Solution (FS)}	Solid Solid Liquid
INCENDIARY	Burning time	Heat Burns	Incendiary	{Thermite (TH) Solid Oils White Phosphorus (WP)}	Solid Solid Solid

(1) *Casualty agent*, an agent used to produce casualties which require evacuation.
 (2) *Harassing agent*, an agent used to force masking, thereby reducing the efficiency of troops.

(3) *Screening agent*, an agent used to produce obscuring smoke.

(4) *Incendiary agent*, an agent used to set fire to enemy material or supplies.

f. The relationship of these various classifications is shown in the accompanying chart. In ordinary military writing and parlance with reference to chemical agents, the following broad classification is generally used:

Gas	{	nonpersistent,
		persistent, or
		irritant
Smoke		
Incendiary.		

g. *Symbols*. Brief lettered symbols are commonly used to designate chemical agents, particularly in identification markings on chemical munitions; e.g., C. G. is the symbol for phosgene.

Concentration and Time of Exposure. The degree of injury produced by a gas depends, not only upon its inherent properties, but upon the *amount* by weight of the substance present in the air, (referred to as the concentration), and the length of the period of exposure. The action of most gases is cumulative; the longer the exposure, the more severe the injury. In general, exposure to a low concentration for a long period will produce the same results as brief exposures to a high concentration.

CHARACTERISTICS OF PRINCIPAL CHEMICAL AGENTS LUNG IRRITANTS

Name and Symbol	Chlorine (CL)	Phosgene (CG)	Chlorpicrin (PS)
Odor	Disagreeable, pungent	Disagreeable, pungent, like new cut hay or cut corn.	Sweetish, like fly paper.
Color and state in field	Greenish yellow gas	First white, changing to colorless gas.	Oily liquid changing slowly in open to colorless gas.
Effects on body	Lung irritant. Causes choking and coughing smarting of eyes, and discomfort in chest. A 2-minute exposure to an average field concentration produces a casualty. Effects begin immediately.	Lung irritant. Choking, coughing, hurried breathing, pains in chest due to irritation of lower lungs. Approximately nine times more toxic than chlorine; a few breaths in average field concentration produce a casualty. Effects begin immediately but progress slowly.	Lung irritant and lacrimator. Lacrimation, coughing, nausea, vomiting, lung irritation. Approximately one-half as toxic as phosgene.
First-aid treatment	Keep quiet and warm. Treat for bronchial pneumonia.	Keep quiet and warm; give heart stimulants; give oxygen in severe cases.	Remove to pure air. Keep quiet and warm. Give light stimulants. Wipe off splashes of liquid on skin with alcoholic disodium sulfite. 1 to 12 hours.
Persistency	Vaporizes almost immediately under field conditions. Drifts as gas with the wind but being heavier than air clings for some time in trenches, shell holes, woods, and other low or protected places.	Vaporizes almost immediately under field conditions. Gas remains considerable time in low or protected places.	
Action on food and water	Contaminates. In some cases may be removed by ventilation and heating but taste remains disagreeable.	Contaminates. In some cases may be removed by ventilation and heating but taste remains disagreeable.	Contaminates. In some cases may be removed by ventilation and heating but taste remains disagreeable.
Action on metal	Dry, none; wet, vigorous corrosion.	Dry, none; wet, vigorous corrosion.	Slight tarnish only.
How used	For casualty effects. In cloud gas attacks as substitute for phosgene or mixed with phosgene or chlorpicrin in cylinders or Livens projectors.	For casualty effects. In cloud gas attack, in cylinders, projectors, medium artillery, mortars, and aviation bombs.	For harassing and casualty effects. In shell, bombs, or airplane spray as substitute for other agents; in like manner mixed with CN; in cloud attacks mixed with CL.
Protection required	Gas mask.	Gas mask.	Gas mask.

VESICANTS

Name and Symbol	Lewisite (MI)	Mustard (HS)
Odor	Like geraniums, then biting.	Like garlic or horseradish.
Color and state in field	Dark brown liquid, changing slowly into a colorless gas.	Dark brown liquid, changing slowly into a colorless gas.
Effects on body	Vesicant, blisters skin. Skin shows slight irritation in 15 minutes, followed by grayish discoloration and blisters in 30 minutes to 1 hour. Systemic poisoning; vomiting. If breathed, powerful lung irritant effects within ½ hour. If unprotected, immediate irritation of eyes. Approximately six times as toxic as phosgene.	Vesicant, blisters skin. Symptoms delayed 2 to 4 hours. If exposed, eyes burn and inflame. Skin in contact with gas or liquid, discolors, followed by blisters and sores. If breathed, hoarse cough develops, followed by severe pain in chest and inflammation of lungs. Approximately four times as toxic as phosgene.
First-aid treatment	Wash with running water and soap, then with 5-percent aqueous solution of caustic soda followed by alcohol. Keep warm and quiet. Treatment must be given immediately. Evacuate to hospital.	Wash continuously with running water and strong soap, then apply carbon tetrachloride saturated with chlorine, or bleach solution. Wash eyes with boric acid or salt solution. Treatment must be given within a few minutes.
Persistency	Dispersed as liquid which slowly changes to gas. Rate of vaporization depends on temperature, vegetation, and method of dispersion. Rapidly destroyed by water. Summer: 24 hours in open; 2 or 3 days in woods. Winter: 1 week or more.	Dispersed as liquid which slowly changes to gas. Rate of vaporization depends on temperature, vegetation, and method of dispersion. Summer: 4 to 5 days in open; 1 week in woods. Winter: Several weeks.
Action on food and water	Poisons unprotected food and water. Cannot be made suitable for use.	Renders unprotected food and water unfit for use.
Action on metal	Very slight.	Very slight.
How used	For casualty effect or to deny ground through threat of casualties. In artillery shell, mortar shell, airplane bombs, airplane spray, and land mines.	For casualty effect or to deny ground through threat of casualties. In artillery shell, mortar shell, airplane bombs, airplane spray, and land mines.
Protection required	Gas mask and protective clothing.	Gas mask and protective clothing.

LACRIMATORS

Name and Symbol	Chloracetophenone (CN)	Tear Gas Solution (CNS)
Odor	Like apple blossoms.	Like fly paper.
Color and state in field	Bluish gray smoke from burning type munition; colorless from shell.	A colorless liquid, changing to colorless gas.
Effects on body	Piercing irritation of eyes causing profuse tears. Effective in extremely low concentrations.	Piercing irritation of the eyes, profuse tears, followed by nausea and vomiting.
First-aid treatment	Wash affected parts with water.	First aid same as for lung irritant cases.
Persistency	Cloud from burning mixture drifts with wind. Will remain in low and protected places for some time. Shell or solid CN may remain several weeks.	Summer: 1 hour in open; 2 hours in woods. Winter: 6 hours in open; 1 week in woods.
Action on food and water	Gives unprotected food disagreeable odor.	Dispersed as liquid which changes to gas. Contaminates. In some cases may be removed by ventilation and heating.
Action on metals	Tarnishes steel slightly.	Tarnishes steel slightly.
How used	For harassing effect. In grenades.	For harassing effect. In artillery shell, mortar shell, airplane bombs, and airplane spray.
Protection required	Gas mask.	Gas mask.

IRRITANT SMOKES (STERNUTATORS)

Name and Symbol	Adamsite (DM)	Sneeze Gas (DA)
Odor	Not definite, slightly like coal smoke.	Grayish smoke cloud.
Color and state in field	A yellow smoke cloud.	Sneezing and burning sensation of the nose and throat. Slight lacrimation followed by occasional nausea, headache, and temporary debility. Immediately effective.
Effects on body	Immediate sneezing followed by headache, nausea, and vomiting. Temporary physical debility. Effective in low concentrations but is delayed about 5 to 10 minutes.	Remove to pure air.
First aid treatment	Remove to pure air.	While burning, drifts with the wind, will remain in low and protected places for some time.
Persistency	General, 5 minutes in open. Poisons unprotected food and water; cannot be made safe for use.	General, 10 minutes in open. Poisons unprotected food and water; cannot be made safe for use.
Action on food and water	Very slight.	Vigorous corrosion on steel.
Action on metals	For harassing effect. In candles or generators.	For harassing effect. In candles or shell.
How used	Gas mask with a good filter.	Gas mask with a good filter.
Protection required		

SCREENING SMOKES

Name and Symbol	Sulphur Trioxide Solution (FS)	HC Mixture	White Phosphorus (WP)
Odor	Acid or acrid.	Acrid, suffocating.	Like phosphorus matches.
Color and state in field	Dispersed as liquid which changes to white smoke upon contact with air.	White smoke produced by burning munitions only.	Dispersed as solid which rapidly changes to flame and white smoke on contact with air.
Effects on body	Mild pricking sensation to skin; non-injurious.	None.	Smoke, none; particles produce severe fire burns which heal very slowly.
First-aid treatment	Wash with copious amounts of water, then with sodium bicarbonate and treat as for ordinary burns.	None needed.	Apply copper sulfate solution (CuSO_4) (2 to 5 percent). This coats the particles with copper which effectively prevents oxidation. Pull out solid particles and treat like an ordinary burn. Keep burning part under water until medical attention arrives if no CuSO_4 is available.
Action on food and water.	Liquid renders food and water unfit for use; smoke gives disagreeable odor.	Smoke gives disagreeable odor.	Smoke gives disagreeable odor; solid is poisonous.
Action on metal.	Vigorous corrosion in presence of moisture.	None, if dry.	None.
How used.	Screening smoke. In airplane spray for screening; in artillery shell, mortar shell, and cylinders for training to simulate cloud gas.	Screening smoke. In smoke pots or candles, for training only.	Screening smoke and incendiary. In artillery shell and mortar shell, primarily for smoke effect; also used in same munitions and airplane bombs for casualty effect and incendiary action.
Protection required	None.	None.	For smoke, none; for burning particles, none provided.

Characteristics. During and since the World War, many thousands of chemical compounds have been studied for their military possibilities. Of these but a dozen or so are considered of great value. New and more potent agents will undoubtedly be discovered in the future. However, it is believed that the characteristics of any new agent will, in the main, conform to those of some one of the known types. Hence, the practical information about representative agents, contained in the accompanying table, should be of considerable value in meeting any gas-protective problems that may arise.

Objects of Chemical Attack. Chemical attacks are made with one or more of the following objects in view:

- To inflict casualties.
- To deny ground by contaminating it with persistent gas.
- To contaminate material and supplies.
- To harass by forcing the use of gas masks.
- To lower the morale of troops.
- To interfere with observation by smoke.
- To destroy material and supplies by burning.

Tactical Principles in Use of Gas. *a. Nonpersistent gas.* Surprise is essential for appreciable casualty effect, hence, when this gas is used in projectiles fire is sudden, rapid and intense, but usually of short duration. Successive bombardments, at varying intervals of time, are suitable. Massed troops in stationary position, particularly troops asleep, are the most profitable targets.

b. Persistent gas. In an offensive this type of gas is used only on areas which the attacking troops will avoid in their advance. It may be used extensively by a defender. Fire to deny ground may be slow, but fire against personnel for casualty effect should be executed rapidly.

c. Irritant gas. Harassing agents are useful, particularly against troops at work on their position or engaged in bringing up supplies. These agents are effective in very low concentrations and therefore are economical in ammunition expenditure.

d. Smoke. Smoke is used to blind hostile observation and for deception. In attack, smoke is placed directly upon the defender's forward positions to prevent aimed fire upon

advancing troops. It is also used against rearward observation points. In defense, the use of smoke is limited so as not to obscure the defender's own field of fire.

c. Incendiaries. These agents are used primarily for destruction of material.

Weather and Terrain Influences. *a. Weather.* Gas and smoke clouds travel with the wind, spreading and thinning out as they travel from their source. The rate of width increase is about 15% of the distance traveled. Winds of more than 12 miles per hour velocity tear chemical clouds apart and disperse them rapidly.

Sunshine, especially in warm weather, is conducive to rising air currents (convection)

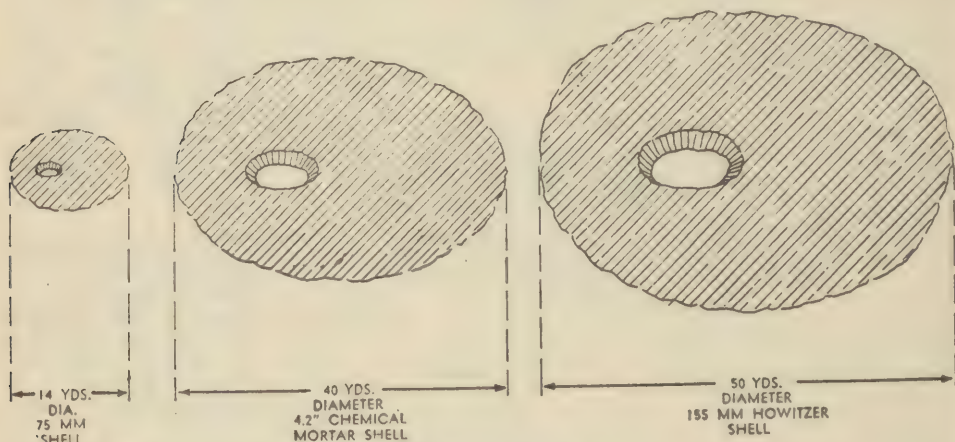


Plate 1. Chemical Shell Bursts.

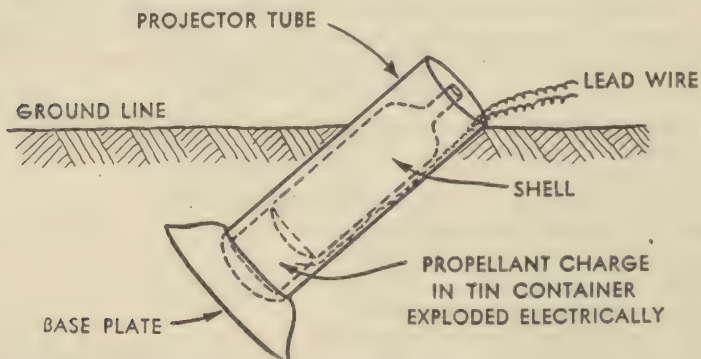


Plate 2. Livens Projector.

which rapidly dissipate chemical clouds by causing them to rise. In the case of persistent agents, warm weather accelerates their evaporation. Rain may destroy or partially destroy gas or smoke by beating it out of the air, draining it away, or by chemical action (hydrolysis).

Cool, cloudy weather with wind steady at low velocity, is favorable for the use of non-persistent gas. On the other hand, warm weather is generally more suitable for persistent gas because a higher concentration is then developed than when the weather is cool. Mustard gas solidifies in freezing weather, remaining inert until the temperature rises sufficiently to melt it. Lewisite is effective in cold weather but is destroyed by moisture.

b. Terrain. War gases, being heavier than air, tend to hug the ground, flow downhill and collect in depressions, remaining effective in such places for a considerable time after the open, high areas are clear of gas. In woods, rising air currents are generally absent or

less pronounced, and wind velocity is retarded. Hence, low-lying woods are the best target area for gas. Ground covered with dense undergrowth is especially suitable for use of vesicant agents, since men, moving through such areas, will brush off the chemical on their clothing.

Chemical Mortar and Artillery Shell Attacks. *a.* The chemical mortar is a light, mobile cannon, designed for rapid high-angle fire of large capacity shell. Within its maximum range, generally less than 3000 yards, mortars may be used to put down and maintain high concentrations of persistent or nonpersistent gas, fire smoke, or incendiary agents. Both light and medium field artillery pieces may be similarly used, though the light gun is not suitable for fire of nonpersistent gas shell.

b. Danger areas. A chemical shell contains sufficient explosive to break it open upon impact and disperse the chemical (see illustrations). The danger area is not only that over

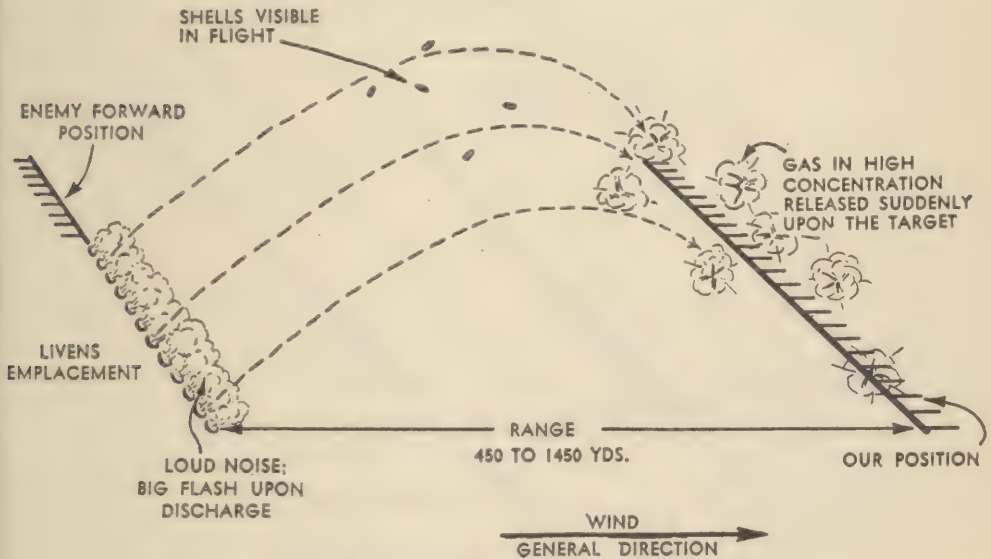


Plate 3. Livens Projector Attack—Diagrammatic Illustration.

which the chemical is thrown upon explosion, but extends for some distance downwind therefrom. In the case of nonpersistent gas, this danger distance varies from 200 to 300 yards for a single shell, to several miles for a heavy concentration over a wide front.

In the case of explosion of persistent gas shell, a part of the chemical changes immediately to gas; part of it is so finely atomized that it, too, travels with the wind, while the remainder, in liquid form, is distributed over the ground and slowly changes to gas. Thus, downwind from the point of burst, there continues to be a danger area until vaporization of the chemical is complete. The depth of this area varies from about 200 yards, for a single shell, to 1000 yards, or possibly more, in the case of a heavy concentration on a wide front.

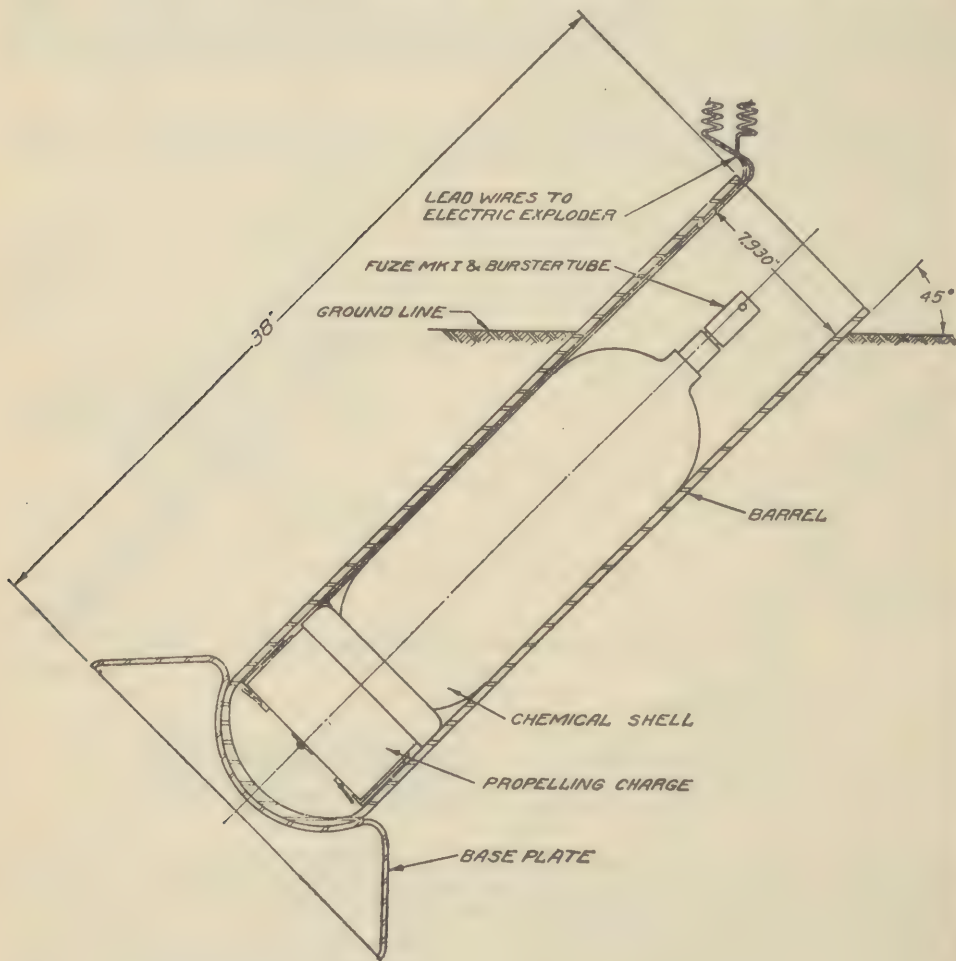
A chemical shell containing a liquid can ordinarily be distinguished from other shells by the peculiar intermittent, whirring noise it makes in flight and by its low detonation.

Chemical Projector Shell Attacks. The projector is a simple mortar of large bore, which fires one shot per installation. It has a comparatively short range, the maximum being usually about 1500 yards. For employment, projectors, generally in large numbers, are emplaced close together in the user's front line, and discharged simultaneously by an electric current. By this means gas in very high concentration can be released suddenly upon a target.

Projector attacks are likely to be followed shortly by infantry attack. An enemy may fire two salvos, first one of high explosive, for tremendous blasting effect on targets above

ground, and then one of nonpersistent gas to reach targets in trenches and dug-outs. An enemy on the defensive may use persistent gas with projectors.

Projectors are generally emplaced at night, for fire that night or early the following morning. Their installation may sometimes be discovered by aerial observation. The metallic sounds usually made in emplacing them, possibly may be heard in our lines. In



FULL SURFACE SET UP

Plate 4. Livens Projector MK1.

large scale gas operations, the danger area extends several thousand yards downwind of the impact zone.

When fired, the brilliant flash of discharge may be seen, or the loud noise of same heard, in time to enable troops in the target area to adjust gas masks before the shells fall.

Chemical Attacks from Aircraft. Either bombs, or apparatus for spraying persistent gas or smoke, may be used in chemical attacks from aircraft. Small bombs containing persistent gas, or white phosphorus, may be dropped from high or low altitudes. Large bombs weighing 100 pounds or more, containing nonpersistent or persistent gas, may be employed by bombardment aviation. Persistent gas may be used in conjunction with demolition bombs to hamper, or prevent the repair work. Incendiary bombs, both large and small, are also applicable.

Persistent agents, such as mustard gas or Lewisite, may be sprayed from airplanes in attacks upon ground troops or used to contaminate ground or supplies. The persistency of such agents when sprayed from airplanes is considerably less than when fired from shell, owing to the small size of the drops and consequent increased surface area of the liquid exposed to the air. Attack aircraft flying at 50 to 1000 feet can lay a belt of persistent gas approximately one mile long, the width of the belt depending upon the altitude of the plane and the wind velocity and direction. A plane flying at 100 feet elevation, with a cross wind of 10 miles per hour, can gas an area one mile long by 100 yards wide. Troops in column present a particularly favorable target for such attack.

Until chemical is sprayed or bombs burst, there is no way for troops on the ground to determine whether chemicals, other means, or both will be used. Consequently, upon warning of the approach of hostile aircraft, particularly low-flying airplanes, gas masks should be adjusted.

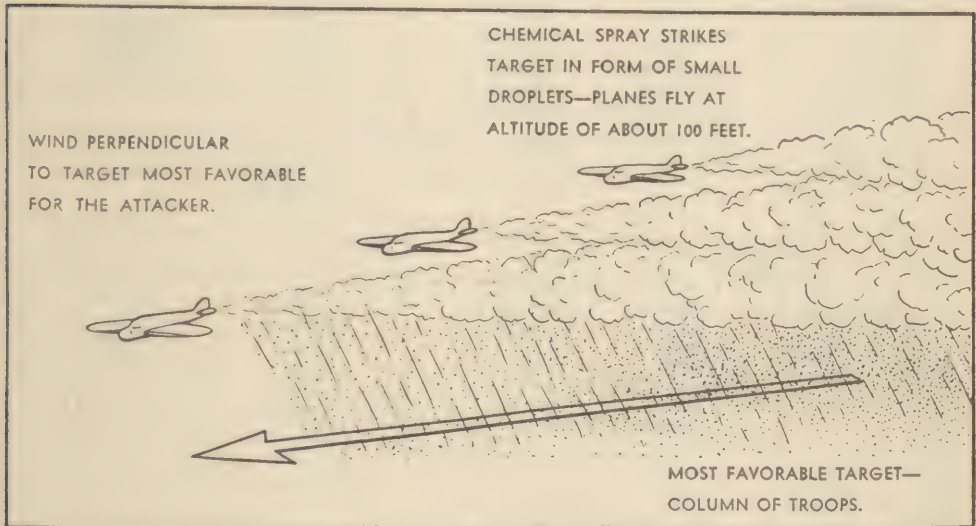


Plate 5. Airplane Chemical Spray Attack.

Cloud Attacks With Cylinders or Candles. Cylinders filled with nonpersistent gas which vaporizes upon release by opening valves, or candles for generating clouds of irritant smokes by a burning process, may be employed by an enemy when the wind conditions are such as to carry the chemical cloud from his position to that of the target. Such weapons are applicable, primarily, to stabilized situations. Cloud attacks usually are conducted on a large scale to effect an area extending for several miles downwind from the place of release of the chemical. These attacks are generally made at night, or during the early morning, with a view to surprise effect. The gas cloud is normally white from condensed water vapor, but the actual position and width of the front of attack is likely to be disguised by smoke. At the moment of discharge of gas cylinders the hissing noise made as the gas escapes may be heard in time to give warning.

Use of Chemical Land Mines and Bulk Chemicals. An enemy organizing a position for defense or engaged in a retrograde movement, may make use of mines filled with persistent chemicals to contaminate roads, or other important areas, to deny their use. For such purposes, persistent gas may also be liberated from containers carried on tanks or other vehicles. Gas, thus employed by these means, is highly persistent. It can be detected by odor and visible splashes.

Use of Chemical Grenades. Hand grenades filled with irritant gas, or white phosphorus, may be used in local operations, particularly to force personnel to evacuate dug-outs or other inclosed spaces. Hand grenades can be thrown about 35 yards.

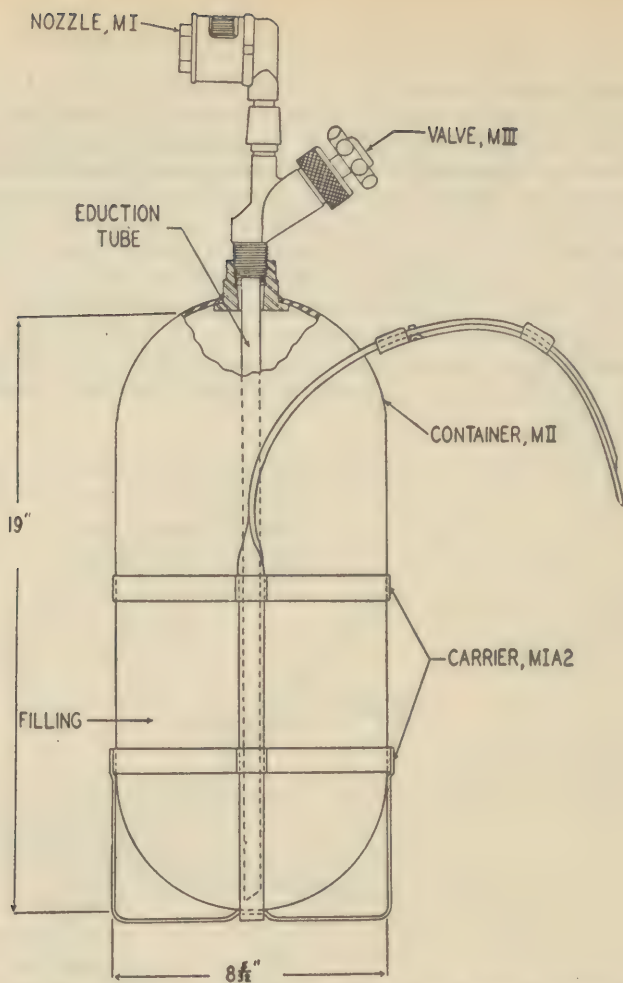


Plate 6. Portable Cylinder with Nozzle and Firing Device.

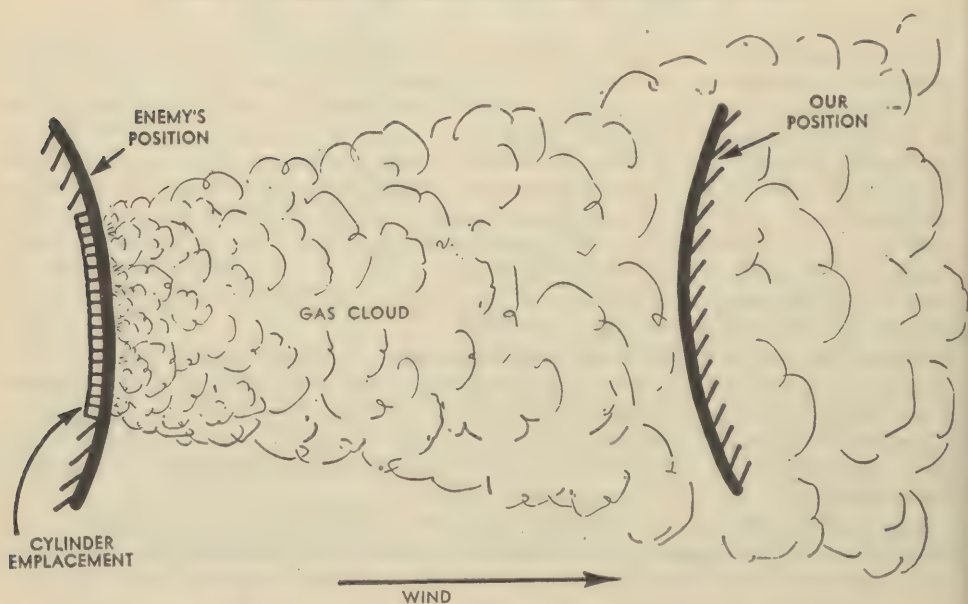


Plate 7. Gas Cloud Attack with Cylinders—Diagrammatic Illustration.

PROTECTIVE EQUIPMENT AND PROCEDURE

Classification of Protective Measures. Protection against chemical attack involves both technical and tactical measures. *a. Technical protection* is passive in character. It consists of (1) *individual protection*, or the equipment and measures applicable to the individual, and (2) *collective protection*, or the unit equipment and measures applying to a group.

b. Tactical protection has to do with active measures of security against hostile chemical operations.

The Army Gas Mask. *a. Description.* The principal item of individual protection is the Army gas mask. This mask consists of a facepiece, hose tube, canister, and canvas bag

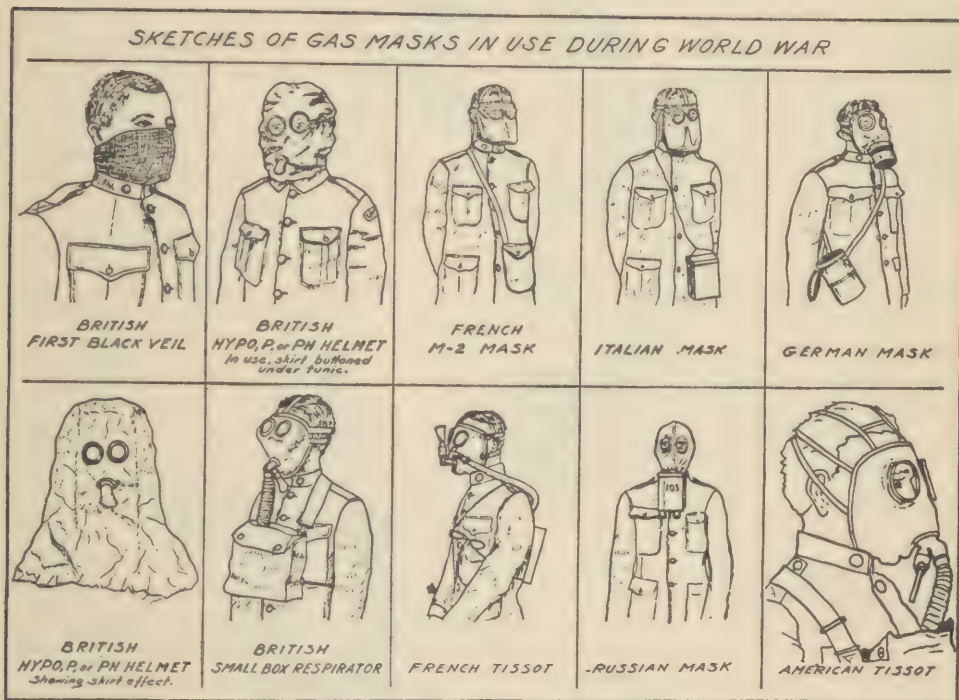


Plate 8. World War Gas Masks.

carrier. A mask is carried at all times in the field by each soldier. It is adjusted upon sounding of a gas alarm, or whenever the individual detects the presence of gas. When the mask is worn, all inspired air is drawn through the canister, where war gas or smoke is removed. Exhaled air passes out through a valve connected to the facepiece. Protection depends upon a properly fitting mask, free of leaks, and a serviceable canister.

b. Limitations. The Army gas mask is designed for protection against war gases only. It is unsuitable for use in fighting fires, fumigation work, or any activity in which toxic gases, such as carbon monoxide or ammonia gas, may be encountered. For such cases, special canisters should be used. Another important limitation is, that being solely an air filter, the Army mask does not protect against atmospheres deficient in oxygen.

c. Service life. After considerable use, the filter components of the canister may deteriorate, or become saturated. However, before a canister becomes dangerous, it gives warning of its deterioration by admitting a minute quantity of gas which can be smelled. Periodic inspection of masks issued to troops should be made by officers.

d. Training. A gas mask impairs the efficiency of the wearer by resistance to breathing and limitation of vision. The handicap is, in part, psychological. It can largely be overcome by training, gradually increasing the periods of wear.

Fitting of gas masks, gas mask drill, and use of the gas chamber pertain to field training and hence are not dealt with here.

Protective Clothing. Protective clothing, which is designed for the protection of the body against gases of the mustard type, will be issued in time of war.

Identification of Gases. No practicable apparatus for identification of gas in the field

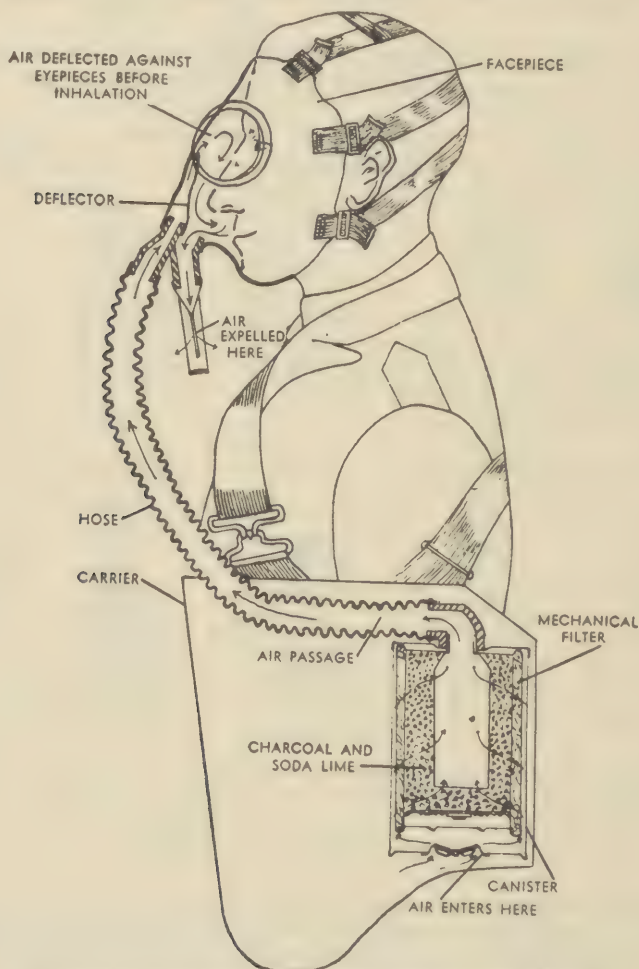


Plate 9. Present United States Service Gas Mask.

has been devised. Soldiers must depend on their sense of smell to detect and identify gases by their distinctive odors.

First Aid. Every soldier should be thoroughly familiar with the first aid treatment of injuries from chemicals as set forth in the table, Characteristics of Agents. In rendering first aid treatment to gas casualties, a gas mask and protective gloves should be worn.

Gas Discipline. The prompt and orderly adoption of proper protective measures by a command, when it is subjected to a gas attack, is evidence of good gas discipline. Such discipline comes through knowledge and training. With respect to the individual soldier gas discipline means that he has no unreasonable fear of gas; has confidence in his protective equipment; upon detecting gas, he at once shouts "GAS," and then holds his breath until his mask is adjusted.

Gas-Proof Shelters. A gas-proof shelter is an inclosed space rendered gas-tight. It should

have a double doorway in the form of an *air-lock* to prevent gas from penetrating the enclosure as men enter or leave it. In areas subjected to gassing for long periods, gas shelters are needed as places where men may eat, sleep, and rest. They are desirable especially for command posts, telephone exchanges, and aid stations. Non-ventilated shelters are usually suitable for use for several hours, if necessary.

Collective Protector. A collective protector is a device for ventilation of a gas shelter. It consists of a motor-driven, or hand-operated blower, and a large canister to purify the air drawn into the enclosure.

Gas Alarms. Where a large force is involved a gas alarm system, applicable to a wide area, should be provided. Steam whistles or siren horns, if available, may be employed. Frequently, means of rapid communication will have to be depended upon. As local alarms, Klaxon horns, and other similar devices which make a distinctive sound may be used.

Degassing and Decontamination. Following gas attacks, it frequently will be necessary to carry out rather elaborate measures to get rid of the gas. Even gasses of the nonpersistent type tend to collect and tend to persist in trenches and dug-outs. The problem here is one of ventilation. Fanning, and the building of fires to create drafts, should be resorted to. Clothing and equipment which smell of the gas should be exposed to wind and sun; metal equipment, especially if damp, should be cleaned and re-oiled to prevent corrosion; and food and other supplies which have been exposed should be examined for evidences of damage or poisoning.

In the case of an attack with a persistent agent, such as mustard gas, neutralizing chemicals must be employed. The cleaning processes involved are referred to as decontamination. Men engaged in this work must wear gas masks and protective clothing.

Decontamination materials usually available are water, earth, soap, kerosene or gasoline, and chloride of lime. A supply of the latter is part of the field equipment of combat units.

Water, unless hot, has little effect on mustard gas, except that, when applied with pressure, it may drain off some of the chemical. Water destroys Lewisite as such, but a toxic solid residue is left. This gives off no vapor, but is dangerous to touch. Wherever possible, sodium hydroxide should be used to neutralize Lewisite.

Kerosene and gasoline do not destroy vesicant agents, but dissolve them, hence they are useful in cleaning contaminated articles.

Chloride of lime destroys mustard gas. However, when used for this purpose, it should be mixed with water, or earth, to prevent a violent heat reaction and consequent driving off of gas in high concentration. Chloride of lime is corrosive to metal and should not be used to decontaminate working parts of guns or machinery.

a. Ground. It is impracticable to decontaminate a large area of ground with chemicals. Sometimes an area may be decontaminated by burning it off. During the burning friendly personnel should keep away from the downwind side of the area. Small areas, such as a few mustard gas shell holes, especially near an important installation, can and should be decontaminated by covering them with a 3-inch layer of one part dry chloride of lime to about three parts of earth.

b. Concrete. Contaminated concrete installations should be covered with a paste made of chloride of lime and water. This should be left on for at least 24 hours, then washed off, and the surface covered with sodium silicate (water glass) to seal in any of the agent which may remain.

c. Wood. It is practically impossible to decontaminate wood permeated with persistent gas. Wood buildings and objects so contaminated, which constitute a source of danger, should be burned.

d. Metal. Metal equipment, including guns and ammunition, in so far as practicable, should be protected by paulins, or placed in gas shelters. If contaminated, such equipment should be swabbed with kerosene or gasoline, then with chloride of lime if practicable. They finally should be washed with hot water and soap, and re-oiled.

Vesicant agents are readily absorbed by ordinary paint, hence are difficult to remove from painted articles, unless they are treated at once.

e. Vehicles. Vehicles splashed with gas may be partially decontaminated by hosing them

down with water, preferably hot, but as soon as possible treatment with neutralizing chemicals should be undertaken.

f. Clothing. Persistent gas can be removed from clothing and fabric by steaming the articles for about six hours. This process may be reduced to two hours, if the articles are first exposed, for one hour, to chlorine.

g. Leather. Harness and other leather equipment, which has been sprayed or splashed with liquid vesicants must be treated at once. If permeated by chemicals, such equipment should be burned or buried.

Protection of Food and Water. Whenever practicable, food, forage, and water supplies should be kept in gas-tight containers until used. Food, suspected of gas poisoning, usually should be discarded. In no case should questionable water be used for either drinking or washing, until approved by a medical officer. Mustard gas may be removed from water by boiling, settling, and chlorination. But in the case of Lewisite and other arsenical agents, such treatment is not effective. Water in shell holes should in no case be used.

Bathing and Re-Clothing Units. In the World War mobile units, consisting of trucks provided with shower bath equipment and supplies of fresh clothing, were employed for the protection of troops exposed to mustard gas. These measures will be required when similar chemicals are used in the future.

Protection of Animals. Horses and mules are much less susceptible to gas, generally speaking, than man. These animals, however, are highly susceptible to injury by gases of the mustard type. Animals working in gassed areas should be protected by gas masks, and also by gas-proof boots, if the area contains a vesicant substance. They should be washed at once after exposure to a vesicant agent.

Pigeons should be protected during gas attacks by gas-proof loft covers, or should be released.

Gas Protective Organization. Organization commanders have on their staffs specialists in gas protection who supervise the execution of protective measures under the authority of the commander.

In the division, corps and army, these specialists are officers of the Chemical Warfare Service, referred to as chemical officers. They handle the supply of gas protective equipment, conduct schools in gas defense, make inspections, carry on chemical warfare intelligence and reconnaissance activities, and advise the commander on all matters pertaining to chemical warfare.

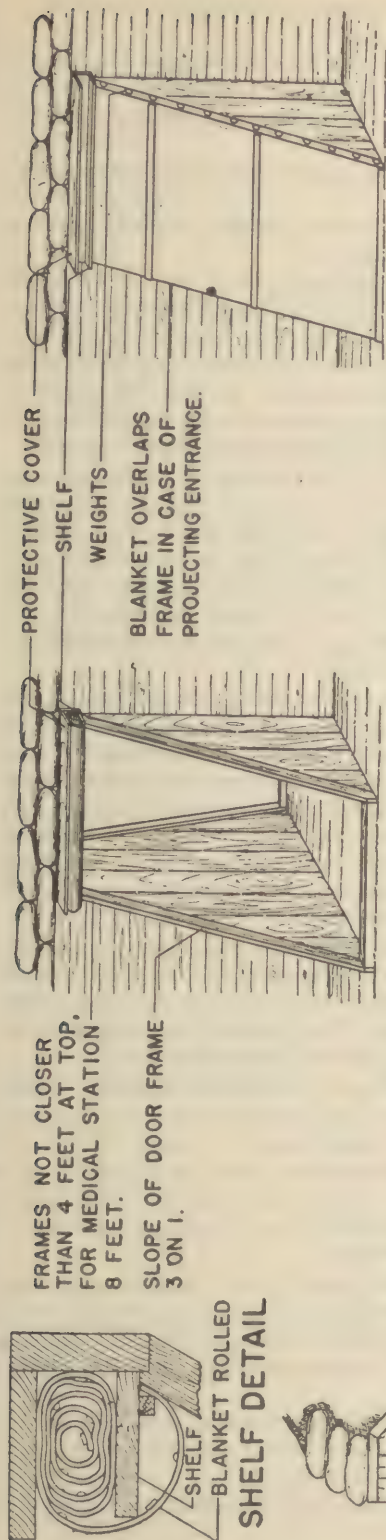
Each unit below the division, down to the battalion, details an officer as the *unit gas officer*. He is directly concerned with gas defensive training of troops, inspection and maintenance of protective equipment, gas reconnaissance in battle, and supervision of degassing and decontamination work.

Each company, troop, or battery, details a *gas noncommissioned officer* to assist the company commander in his gas protective duties.

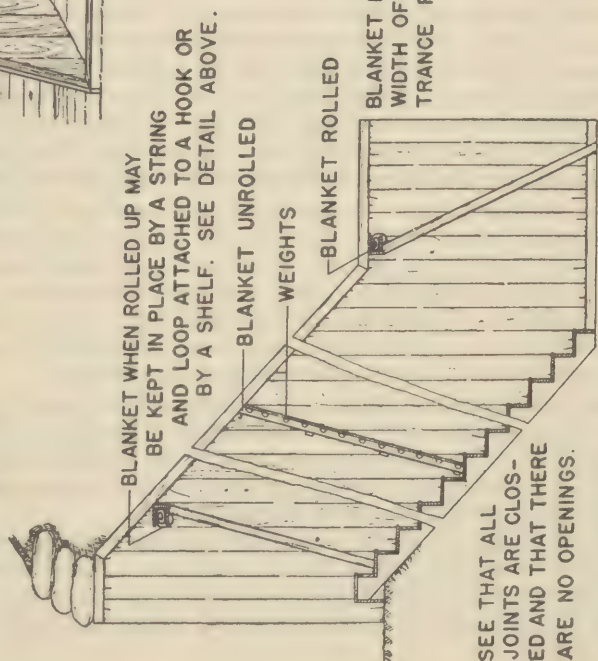
Gas Sentries. Each combat unit provides its own gas sentries. Their principal duty is to detect the presence of gas in their areas, give the alarm when gas is so detected, and awaken sleeping men in their areas in time for these men to adjust their gas masks before being dangerously exposed. The number of gas sentries to be provided depends upon the number of men to be protected, and the size of the area over which the men are distributed. Gas sentries should be intelligent, alert and active, and possess keen senses of smell and hearing. They should sound their alarms only when they actually detect gas in their areas. To sound an alarm merely because an alarm in another area is heard, might result in needless disturbance of sleeping troops.

Standing Orders. Standing orders for defense against chemical attack are general orders issued by each army, corps, division, or smaller force, if acting independently, which prescribe definite and uniform training and procedure in the protection of the command against gas. They are issued upon mobilization, and are modified from time to time as necessary.

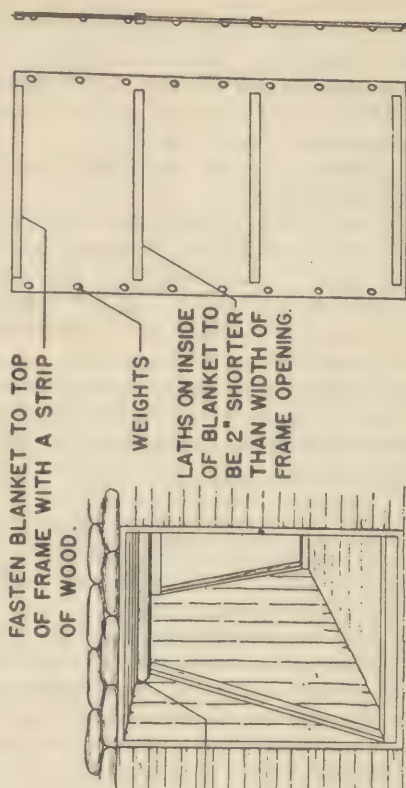
Tactical Protection. Tactical protection includes such activities as chemical warfare reconnaissance and intelligence, consideration of the influence of chemical warfare on



PROJECTING ENTRANCE



ARRANGEMENT OF GAS BLANKETS



HORIZONTAL GALLERY

BLANKET DETAIL

Plate 10. Gas-Proofing Dugouts.

selection of routes of march and battle positions, maneuver to avoid gassed areas, and offensive action to limit or disrupt hostile chemical attacks.

Chemical Intelligence. Military intelligence, pertaining to chemical warfare, is derived and disseminated generally by the same agencies providing other intelligence. However, by reason of its technical nature, officers, having special training in chemical warfare, usually are depended upon to secure it.

War Department chemical intelligence pertains to the enemy's chemical warfare policy, training, and capability.

Chemical combat intelligence deals with information of the chemical warfare activities, preparations, and intentions of the enemy forces in the field.

Gas Indications. It may be expected that an enemy will seek to vary his use of gas so as to conceal his intentions. It is unsafe, therefore, to depend on gas indications alone in estimating the enemy's future action. However, in the main, chemical operations will conform to well established tactical principles. An attack with nonpersistent gas is likely to be followed shortly by an attack by infantry or by a repetition of the gassing. Such attacks may be masked by smoke. On the other hand, the gassing of an area with persistent gas is a good indication that the enemy does not intend to send foot troops through that area.

Chemical Reconnaissance. *a. Chemical reconnaissance on the march.* (1) Distant reconnaissance. Aviation, motorized, or mounted elements are looked to for early information bearing directly, or indirectly, upon protection against gas. Maps and air photographs will show critical areas, such as defiles, which favor the use of chemicals by the enemy; alternate routes, which may be used to avoid such areas; and suitable localities for halts. For gas protection, a bivouac area should be on high ground devoid of dense undergrowth, but containing sufficient trees for concealment. It should be large enough to accommodate the force without crowding. Water supply should be convenient.

(2) Close reconnaissance. The composition of advance guards should include one or more unit gas officers. In case a gassed area is encountered, a gas officer should determine its extent, and seek a means of avoiding or passing through it with the least possible delay or danger to the column. Guides or signs should be posted as necessary to inform the main body of these gassed areas and the alternate routes to take in order to avoid them. An advance guard should be equipped to deal at once with minor gas situations as encountered.

When the main body deploys for advance on a broad front, unit gas officers, assisted as necessary by gas noncommissioned officers, should reconnoiter for gassed areas in the path of the advance, and inform their commanders of the localities.

b. Contact. After contact is gained, and throughout battle, unit gas officers are engaged continuously in chemical reconnaissance. They should study the terrain in the unit areas, note suitable localities for use of gas by the enemy, and be prepared to make recommendations for the disposition of the unit for gas protection. They should inspect gassed areas and inform their commanders of the kind of gas used and the danger involved.

Passage of Gassed Areas. Troops, upon encountering a gas-contaminated area, should, if possible, pass around it on its upwind side. If the passage must be made on the downwind side, it should be carried out quickly and gas masks should be worn. When it is impossible to pass around such an area, steps should be taken to insure maximum safety in passing through it. If there is a road, it usually will be desirable to use it. If there is no road, and the area is covered with underbrush, lanes should be cut through the area to enable troops to avoid contact with contaminated vegetation.

Terrain Considerations. High, open, bare ground is generally the safest from the viewpoint of gas protection. But low, wooded ground is that which provides concealment and cover from fire. The relative importance of these conflicting factors will vary in different situations. In many cases, in selecting positions for battle installation, some compromise, using reverse slopes of hills, may be practicable.

While gas clouds travel generally with the wind, their movement is affected materially by terrain. Woods and broken ground retard them. Deep valleys and ravines cause eddying air currents, which divert gas clouds from a straight path.

Small woods, which an enemy may well suspect of being occupied, are likely to be heavily gassed.

Chemical Attack From the Air. There do not appear to be any tactical measures for protection against chemical attack from the air, other than those which apply equally to other forms of air attack. Such general measures are concealment by night marches; use of concealed bivouac areas; such separation of units as is practicable, avoidance of main highways; provisions for warning of the approach of hostile aircraft; deployment; and anti-aircraft fire.

Upon warning of the approach of hostile low-flying airplanes, gas masks should be adjusted promptly. In case of a chemical spray attack, such vertical and overhead cover as available should be taken. A raincoat, paulin or shelter-half, if it can be thrown over the body in time, will give immediate protection, but, if contaminated, it must be discarded after the attack is over. Troops in covered vehicles are protected from such spray, provided they wear gas masks. When the hostile planes have passed, troops should be moved out of the gassed area and first aid and decontamination measures taken at once. Trees provide very little protection from chemical spray.

Plans of Protection. A force in bivouac, where it is subject to chemical attack, or occupying a defensive position, should prepare plans for gas protection for that locality. These plans provide a coordinated scheme for occupation of an alternate position by each unit in case its original position is rendered untenable with persistent gas. The plans must insure against selection of the same alternate position by two or more units, and avoid movements which might jeopardize the safety of the force, or interfere with the accomplishment of its mission. An important area should be evacuated only when it is certain that the enemy is employing persistent gas in such quantity as to render the area unsafe to occupy, and not merely for harassing purposes.

Offensive Action. Hostile preparations for chemical operations, such as installation of Livens projectors or other chemical weapons, whenever discovered, should be disrupted by fire or such other offensive action as is practicable.

Action During and After Gas Attack. When the gas alarm is sounded, or a hostile gas attack is launched, troops adjust their masks and take such cover as is afforded. The doors of gas shelters, if provided, are closed; any fires for heating same are put out to avoid drafts; and supplies and equipment, in so far as practicable, are covered to protect them from gas. Troops in forward positions prepare to resist an attack by hostile infantry. Unit gas officers note the intensity of the enemy's fire, identify the kind of chemical used, and if necessary, obtain samples of the agent and forward them to the rear for examination. If a persistent vesicant agent is used, unit gas officers determine and report the extent of the gassed area, estimate the danger of continued occupation of the unit's position, and, where necessary, make recommendations to their commanders for the removal of the troops to another position. After the gas attack is over officers guard against any relaxation of vigilance in their commands, since one gas bombardment is likely to be followed by another. As soon as practicable, casualties are evacuated, and such degassing or decontamination measures as are required are undertaken.

CHAPTER X

MAP READING

INTRODUCTION

Map Reading for the Medical Officer. Map reading is an essential subject for the officer of the Medical Department. It is vital for officers assigned to duty with medical detachments of regiments of infantry, cavalry, or field artillery, or to the medical regiment or squadron of infantry or cavalry divisions. During marches, in campaign or battle, as well as in maneuvers and garrison service, the personnel of the department must provide continuous and adequate medical care, in whatever trying circumstances may be presented, in order to accomplish the important missions with which it is charged. This service must be taken to the troops. Medical units must move with the same facility, by the same general means, and for the same reasons. They must move and displace to new locations as the tactical situation changes and as the troops advance or retire. The statement, "Terrain is a tyrant," applies to the medical officer, in the execution of his field duties, to the same extent as to the officer of the arms and for the same reasons. Maps picture terrain. The location and nature of roads and railroads, of cities and villages, of streams and the ridge lines which control their flow, of woods and forests, and cultivated fields are all shown on military maps. The nature of the terrain will usually determine the exact location of any tactical installation. *The map is a primary fighting instrument of the officer.*

A knowledge of map reading is necessary in order to understand orders which are received. The width and depth of the areas utilized in action by the infantry or cavalry division may extend over several miles. The single factor of time will usually preclude that complete and definitive terrain reconnaissance which would be necessary if maps were not used. Immediately the medical officer receives the commander's tactical plan he will start the preparation of the medical plan to support it. Map study will facilitate his understanding of his task. It will indicate areas which should be visited in order to make a wise choice of locations for medical installations, as it will also enable him to eliminate from consideration entire areas which are thus disclosed to be unsuitable. His own order is likely to be issued with reference to a map. He must not permit himself to rely entirely on maps to the exclusion of ground reconnaissance. But he must use the one to supplement the other. On the battlefield the officer of any arm or service who lacks adeptness in the use of maps will be of doubtful value as a leader.

This knowledge need not, however, include all of the phases which are necessary for the officer of engineers, for example, nor as required by the infantry or field artillery officer who uses the map for purposes of fire control or adjustment. He will need to develop proficiency in the following specific map reading tasks:

- (1) Knowledge of conventional signs and special military symbols.
- (2) Location and coordinates, especially grid coordinates.
- (3) Measurement of map distances.
- (4) Direction and azimuth.
- (5) Elevation, relief, and terrain structure.
- (6) Use of the compass.
- (7) Practical application of map reading in the field.

Military Maps. While the military will use any and all maps, including aerial photographs, that come to hand, to the full extent of their capabilities, experience has indicated that certain types of maps are best suited to military needs. Therefore, maps constructed by the military will usually fall within one or another of the following classifications, as will maps of probable military use made by other government agencies:

a. The strategic map. A small scale (1:500,000) map, one sheet of which covers several hundred square miles. It is used by the commanders of major units, such as corps and larger.

b. The tactical map. A topographical map of a scale of about one inch to the mile (1:62,500). Sheets are produced, covering an area of 15 minutes of latitude by 15 minutes

of longitude, or about 20 miles on a side, by the *U. S. Geological Survey*. Such sheets are often called "quadrangles." This is the type of map expected to be most available and most useful in time of war. It is, therefore, considered the standard type for tactical operations within the division.

c. The terrain map. A large scale (1:20,000) topographical map showing the terrain in great detail. It is not expected that such maps will be available in quantity for field operations, and their present use is intended for indoor tactical instruction when it is impractical to utilize the terrain itself.

Conventional Signs. The purpose of a map is to convey to the reader accurate information concerning the various terrain features occurring in the area under study. The body of the map consists of signs or symbols, each representing some terrain feature occurring in that area. These are arranged on the body of the map in the same horizontal relationship, one to another, that the features themselves hold to each other on the ground. The symbols by which the ground features are represented are called *Conventional Signs*. These have been standardized and are published in *Training Regulations No. 190-10*, and in Chapter 6, *Basic Field Manual, Volume 1*. The map shown in Plate 1 contains most of the standard conventional signs used on both military and civilian maps. Con-

CONVENTIONAL SIGNS SHOWN ON PLATE 1.

Numerical Key.	Alphabetical Key.	
1. Good motor road, paved.	Bench mark	52
2. Telephone or telegraph line.	Bridge, foot	42
3. Double track standard gauge railroad.	Bridge, highway, general	32
4. Stream or creek (blue on a four-color map.)	Bridge, highway, made of steel (S)	28
5. Fence, smooth wire.	Bridge, truss, or girder	30
6. Triangulation point or primary traverse station.	Bridge, suspension	25
7. Corn field.	Buildings in general	13
8. Fence, barbed wire.	City, town or village (generalized)	43
9. Tall tropical grass.	Combination showing city, town or village	24
10. River (blue on a four-color map.)	Crossing, railroad (RR above)	26
11. Woodland (deciduous trees.)	Crossing, railroad (RR beneath)	15
12. Lone trees.	Cemetery	23
13. Buildings in general.	Church	22
14. Orchard.	Accentuated (every fifth) contour	35
15. Railroad crossings, railroad beneath.	Cultivated field, corn	7
16. Fence of any kind.	Cultivated field, sugar cane	18
17. Schoolhouse.	Cut	29
18. Cultivated field, sugar cane.	Dam	20
19. Grass-land in general.	Demolitions (ruins)	39
20. Dam.	Electric power transmission line	21
21. Electric power transmission line.	Fence of any kind (or board fence)	16
22. Church.	Fence, barbed wire	8
23. Cemetery.	Fence, smooth wire	5
24. City, town or village.	Fence, stone	46
25. Bridge, suspension.	Fence, worm	45
26. Railroad crossing, railroad above.	Fill	27
27. Fill.	Ford, equestrian	43
28. Bridge, steel (S).	Ford, for vehicles	40
29. Cut, railroad.	Grass-land in general	19
30. Bridge, truss or girder, for standard gauge RR.	Grass, tall tropical	9
31. Narrow-gauge railroad.	Marsh in general	50
32. Bridge, highway, general.	Mine or quarry of any kind or open cut)	34
33. Railroad, single track, standard gauge.	Orchard	14
34. Mine or quarry of any kind (or open cut).	Pasture or grass-land in general	35
35. Accentuated (every fifth) contour.	Railroad, double track, standard gauge	3
36. Wire entanglement.	Railroad, narrow gauge	31
37. Low or portable entanglement.	Railroad, single track, standard gauge	33
38. Trenches (dotted when proposed).	River (blue on a four-color map)	10
39. Demolitions (Ruins).	Road, good motor, paved	1
40. Ford, general symbol for vehicle ford.	Road, poor motor or private, unpaved	49
41. Good pack trail or foot path.	Schoolhouse	17
42. Bridge, foot.	Stream or creek, intermittent	44
43. City, town or village (generalized).	Stream or creek, perennial (blue on a four-color map)	4
44. Intermittent stream.	Stream, head of	51
45. Worm fence.	Tank trap	47
46. Stone fence.	Telephone or telegraph line	2
47. Tank trap.	Trail or foot path	41
48. Equestrian ford.	Trees, lone	12
49. Road, poor motor or private, unpaved.	Trees, deciduous	11
50. Marsh in general.	Trenches (dotted when proposed)	38
51. Head of small stream.	Triangulation point or primary traverse station	6
52. Bench mark, Elev. 555 ft.	Wire entanglement	36
	Wire entanglement (low or portable)	37
	Woodland (deciduous trees)	11

Plate 2. Special Military Symbols.

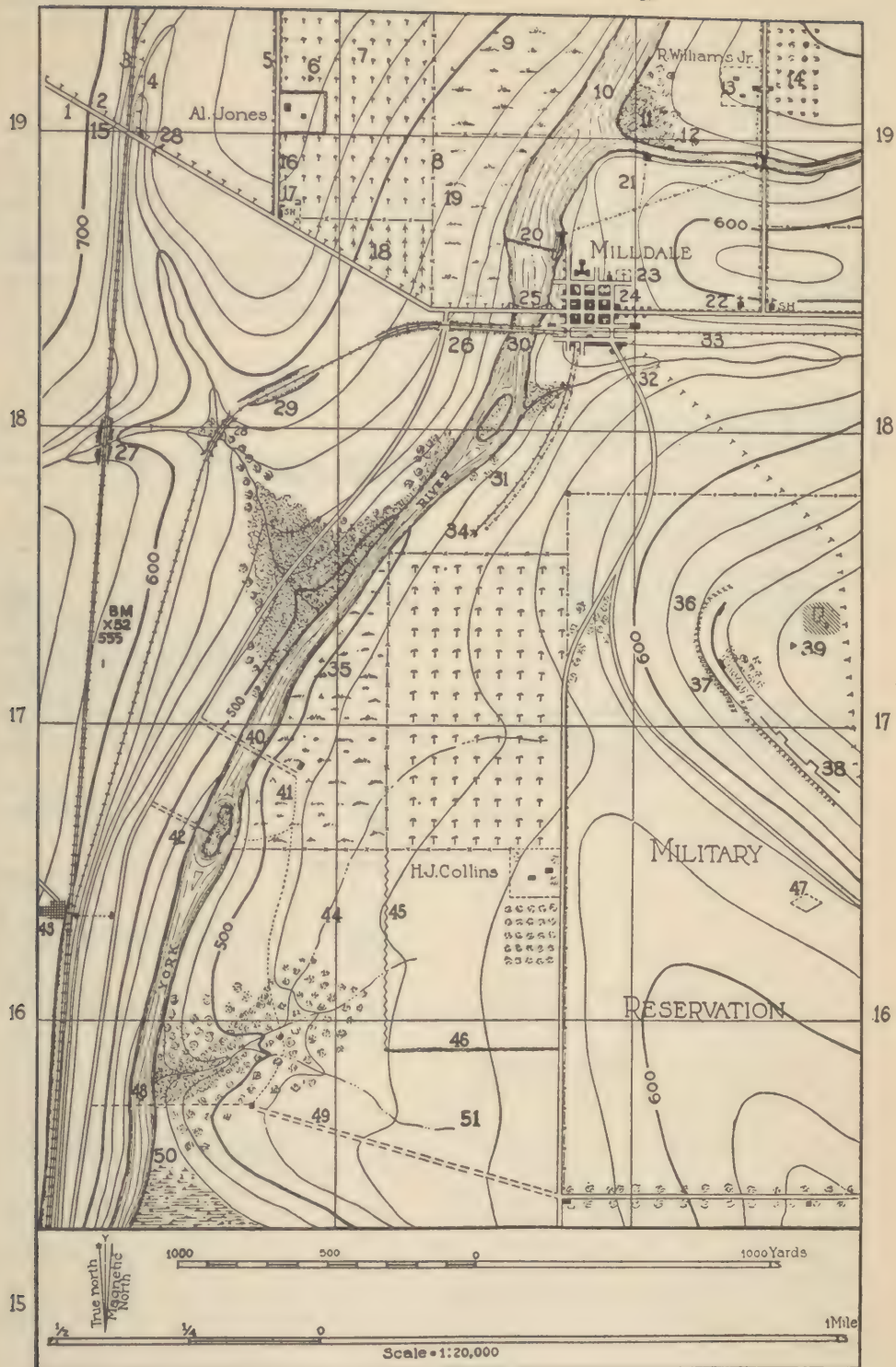


Plate 1. Conventional Signs.

ventional signs have been so devised that they picture or suggest the feature that they represent. Further to increase their value and ease of identification, the standard maps are printed in four colors, as follows:

- a. *Black* for the works of man, names, and the grid.
- b. *Blue* for water.
- c. *Green* for woods and other vegetation.
- d. *Brown* for contours and other forms of relief portrayal.

Special Military Symbols. The map is used as a plotting board upon which to record the dispositions and locations of the enemy and our own troops, and upon which to plan the details of operations. For this purpose a series of symbols have been devised. These are known as *Special Military Symbols* and by means of them the size, identity, and designation of the various units and installations, the location and type of auxiliary weapons, and the various lines and boundaries involved in an operation can be indicated.

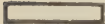
Basic symbols.—(1) Indicating purpose or character of activity.
Military post or station; command post or headquarters



(Lower end of staff or symbol will terminate at point of establishment represented.)
Troop unit
On large scale maps where troop units can be shown to scale, this symbol may be modified so as to show area occupied by units in column or line, thus:



Line



Column



Arsenal, manufacturing establishment, or shop



Embarkation or debarkation point



General hospital



Laboratory, experimental station, or proving ground



Train



Animal-drawn



Motorized



Railway




Mobilization point or area (capacity in figures)  5000


Observation post 


Reception center 

Replacement center 


School 

Supply depot 

Dump, park, or distributing point (temporary depot in combat zone) 

Reserve or base depot 

Intermediate depot 


Supply point 


(2) Indicating arm of service or activity of arm or service.—These symbols will be placed generally within the symbols shown in (1) above. When none of these symbols appears within a symbol shown in (1) above, the activity is of a general nature for the use of all arms and services.

Air Corps 


Balloon 

Airship 

Park for aviation gasoline and oil only 

Ammunition dump for aviation bombs only 


Artillery 

Cavalry, horse (including mechanized elements of horse units) ... 

Cavalry, mechanized 


Chemical Warfare Service 


Engineers 

Infantry (except tanks and military police) 

Tanks 

Military police 


Medical Department 


Veterinary service only 

Ordnance Department 


Ammunition only 

Prisoners of war 

Quartermaster Corps 


Gasoline and oil only 

Class I supplies 

Signal Corps 

(3) Indicating size of units.—These symbols will be placed above the symbols shown in (1) above, or used for indicating boundaries as shown in (4) below.

Squad 


Section 

Platoon 

Company, troop, battery, or Air Corps flight 


Battalion, cavalry squadron, or Air Corps squadron 

Regiment or Air Corps group 

Brigade or Air Corps Wing 

Division 

Corps 

Corps area, department, or section of communications zone 

Communication zone..	0000	Limit of wheeled traffic by day	—DY—
Army	XXXX	Limit beyond which gas masks must be at ALERT..	—G—
General headquarters..	GHQ	Line beyond which lights on vehicles are prohibited	—LT—
(4) Boundaries			
Pursuit aviation (limit of radius of action)	—∞pur—	Straggler line	— P —
Attack aviation (limit of radius of action)	—∞atk—	Outpost line	OPL
Bombardment aviation (limit of radius of action)	—∞bomb—	Main line of resistance	MLR
Observation aviation (limit of zone of reconnaissance):			
Rear limit, army aviation	XXXX —∞obsn—	Support line	SL
Rear limit, corps aviation	XXX —∞obsn—	Battalion reserve line	BRL
Squad	—•—	Regimental reserve line	RRL
Section	—••—	Limiting point	— X —
Platoon	—•••—	Line of communication	—L of C—
Company or similar unit .....	—|—	Line of departure	LD
Battalion or similar unit .....	—||—	Main supply road	MSR
Regiment or similar unit .....	—|||—		
Brigade	—X—	(5) Miscellaneous.	
Division	—XX—	Automatic rifle	→
Corps	—XXX—	(Dotted when emplacement is not occupied, thus) ...	---→
Corps area, department, or section of communications zone	—OOO—	Machine gun (general symbol)	●→
Army	—XXXX—	(Arrow to point in principal direction of fire. When used alone it indicates machine gun, water-cooled, caliber .30.)	●→
Rear boundary of theater of operations	—GHQ—	Light machine gun	●→ L
Front line .....	|||||	Machine gun (caliber .50) ...	●→ 50
Limit of wheeled traffic by night	—NT—	Machine gun (caliber .50) (antiaircraft)	●→ 50 aa
		Machine gun (caliber .50) (antitank)	●→ 50 at

Machine-gun symbol under symbol of any arm indicates machine-gun unit of that arm.

Gun		Message center	
Gun battery		Wire line on ground	
Howitzer or mortar		Cloud gas cylinder	
Howitzer or mortar battery		Landing field	
81-mm. mortar		Advanced landing field	
37-mm. gun		Airdrome	
Sound locator		Balloon bed	
Machine gun (single gun) ..		Balloon ascension point	
(Arrows to indicate sectors of fire, shaded portion to show danger space when fire is placed in final protective line.)		Airship hanger	
Machine-gun section (two guns)		Airship mooring mast	
Normal barrage, one machine gun		Area to be covered by fire ..	
Antimechanized gun		(Indicate character of fire by showing caliber of weapon or by an appropriate description, abbreviation, etc., thus)	
Cemetery		155 mm How	
Torpedo or mine		Area to be gassed	
Searchlight		Gassed area to be avoided ..	
Telephone central located at a command post		One-way traffic	
Switching central		Two-way traffic	
Test station		Dugout (isolated)	
Radio station		Dugout (in connection with trench)	
Pigeon post		Tank trap	
Visual signalling post		Tank Barrier	

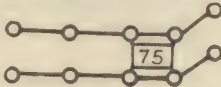
Controlled mines

(This symbol should be used to indicate one 19-mine group, and a separate symbol should be used for each group. As it appears here, the upper part of the page is to be considered the seaward direction, and on charts the symbols should be correspondingly placed, and the length of the line should be such that at the scale of the chart it represents 1,800 feet, the actual length of a mine group, and its position represents the contemplated disposition of the mine group.)



Contact mines

(This symbol should be used so as to indicate on the chart the actual contemplated number of lines and disposition of lines, and the arabic figures should indicate contemplated number of mines in each line.)

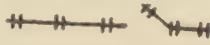


Leader gear

(This symbol should be used on the chart to indicate the exact location of the leader gear.)



Torpedo net (with gate)



Antisubmarine net with gate)



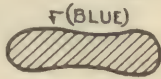
Obstructions (such as piles, hurdles, sunk-on vessels, and booms)



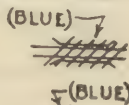
Fixes underwater listening posts



Area covered by demolitions or obstacles



Demolitions, individual



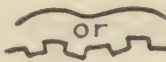
Road block



Obstacle, individual .



Trenches (dotted when proposed)



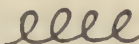
Trench for one squad. (For each additional squad add one traverse.)



Wire entanglement ..





















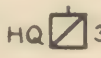



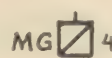






















































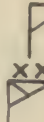


Concealed entanglement













Application of special military symbols.
The following examples show the use of special symbols as applied to various military organizations or activities. They are intended to illustrate the method of combining basic symbols and abbreviations to show the desired information and are only a few of the possible combinations.

(1) Infantry	A 4
1 Sec Co A 4th Inf	
1st Plat Co B 2d Inf	1 B 2
Co D 3d Inf	D 3
1st A Mecz Bn	1a mecz
Co A 3d A Mecz Bn	A 3a mecz
A Mecz Co 4th Inf	A MECZ 4
902d Inf (L Tks)	902 l
903d Inf (M Tks)	903 m
3d Bn 1st Inf	3 1
How Co 3d Inf	HOW 3
1st Inf	1
2d Brig (Inf)	2
1st Div (Inf)	1
910th Inf, L to C	910 L of C
F Tns 2d Inf	FTN 2
1st MP Co	1 mp
CP 3d Bn 4th Inf	3 4
OP 4th Inf	4

Kl 1st Inf	Kl  1	(b) Symbols of elements of the cavalry brigade (mechanized).	 951
Tk Prk		Hq Tr 951st Cav Brig (Mecz)	HQ  951 brig
SA Am DP 1st Div	XX  dp	951st Cav (Mecz)	 951
(2) Cavalry. (a) Symbols representing units of the Cavalry Division (horse).	XX  1	Hq Tr 951st Cav (Mecz)	HQ  951
OP 1st Cav Div	 1	Mort Plat 951st Cav (Mecz)	 951
1st Cav Div Sp Trs	SP TRS  1	Serv Tr 951st Cav (Mecz)	SERV  951
DHQ Tr 1st Cav Div	HQ  1 div	Maint Plat 951st Cav (Mecz)	MAINT  951
2d Cav Brig	 2	MG Tr 951st Cav (Mecz)	MG  951
Hq Tr 2d Cav Brig	HQ  2 brig	R Plat MG Tr 951st Cav (Mecz)	RMG  951
3d Cav	 3	Tr A (Armd-C*) 951st Cav (Mecz)	A (ARMD C)  951
Hq Tr 3d Cav	HQ  3	2d Sq (C-Car*) 951st Cav (Mecz)	2 (C CAR)  951
S Car Plat 4th Cav	S CAR  4	Tr B (C-Car*) 951st Cav (Mecz)	B (C CAR)  951
MG Tr 4th Cav	MG  4	951st Maint Tr (Mecz) ...	MAINT  951
2d Sq 3d Cav	2  3	(3) Artillery (less Anti-aircraft Artillery). Btry F 2d FA	F  2
Tr B 2d Cav	B  2	(This symbol may be used to show artillery position area.)	
L MG Plat Tr F 4th Cav	F  4	C Tn 2d Bn 3d FA	CTN 2  3
3d Plat Tr A 1st Cav	3 A  1	Hq Btry 2d Bn 1st FA ..	HQ 2  1
1st Armd-C Sq	 1 armd c	1st Bn 2d FA	1  2
Tr C 1st Armd-C Sq	 1 armd c	1st Am Tn	 1
1st C-Car Sq	 1 c car	Btry A 1st Am Tn	A  1
Tr A 1st C-Car Sq	A  1 c car	1st FA (H)	 1
910th Cav (L of C)	 910 L of C	*Optional.	

101st FA (155-mm How)		101 how 155mm	106th Engrs (Dep Co)		106 dep
103d FA (155-mm Gn)		103 gn 155mm	904th Engrs (W Sup Bn)		904 w sup
S & F Bn I Corps Arty Brig	S & F 	I corps arly brig	905th Engrs (Shop Co) ..		905 shop
961st FA Bn (Mecs)		951	906th Engrs (Dp Trk Co)		906 dp trk
OP 1st FA		1	908th Engrs (L Pon Co, Mtz)		908 l pon
OP 3d Bn 103d FA	3 	103	951st Engrs (Tr, Mecz) ..		951
912 CA (12" Gn, Ry)		912 gn 12"	Engr DP 1st Div		1 dp
Occupied emplacement, Btry 155-mm How		155mm	Engr Dep I Corps		1
Arty Am DP 2d Div		2dp	Engr Dep No 2, First Army	2 	First
(4) Antiaircraft Artillery.			Water DP 1st Cav Div ..		1 dp
1st Bn 104th CA (AA) (Gn)	1 	104 aa	(6) Signal Corps		
2d Bn 104th CA (AA) (MG)	2 	104 aa	Adv Mag Cen		adv
Btry A 104th CA (AA) (SL)	A 	104 aa	1st Sig Co		1
Btry B, 104th CA (AA) (Gn)	B 	104 aa	901st Sig Bn (Cons)		901 cons
MG Plat Btry E 104th CA (AA) ..	E 	104 aa	1st Sig Tr		1
3d Plat Btry A (SL) 104th CA (AA)	3A 	104 aa	901st Pgn Co		901 pgn
(5) Engineers.			901st Met Co		901 met
Co A 1st Engrs	A 	1	901st Rad Int Co		901 rad int
1st Engr Sq (Mts)		1	Point named on Ar Sig Com		
1st Engr Sq (Mcom)		1	Point on Ar Sig Com 1st Div		1
101st Engrs (Gen Serv)		101 gen serv			
102d Engrs (Sep) .		102 sep			

(7) Air Corps

9th Bomb Gp	 9 bomb
701st Adrm Sq	 701
901st Obsn Sq	 901 obsn
Air Frk	
Bln Frk	
Gas-generating plant	
701st Atk Wg	 701 alk
901st Bln Sq	 901
101st Bln Gp	 101
Second Army Avn	 ^{XXXX} Second


Medical unit in operation




Medical unit not in operation




Bn Aid Sta 1st Bn 4th Inf

1  4 Inf


Regtl Aid Sta 1st FA

 1 FA


Coll Sta 1st Div

^{XX}
 1 coll


Hosp Sta 4th Div

^{XX}
 4 clr


Hosp Sta I Corps

^{XXX}
 I clr


902d Evac Hosp in operation

^{XXXX}
 902 evac

902d Evac Hosp not in operation

^{XXXX}
 902 evac

901st Surgl Hosp

^{XXXX}
 901 surgl


Veterinary unit in operation



Veterinary unit not in operation



Regtl Vet Aid Sta 3d Inf

^{III}
 2 Inf


Vet Coll Sta 1st Div

^{XX}
 1

Vet Cq 3d Med Regt



901st Vet Evac Hosp in operation

^{XXXX}
 901 evac


901st Vet Evac Hosp not in operation

^{XXXX}
 901 evac


1st Med Sq



Tr A (Coll) 1st Med Sq ..

A (COLL)  1

Tr B (Amb) 1st Med Sq .










B (AMB)  1

Tr C (Hosp) 1st Med Sq .

C (HOSP)  1

*Optional

(8) Medical Department.

Serv Co 1st Med Regt ..	SERV  1
Co A (Coll) 1st Med Regt	A (COLL)  1
Co D (Amb, anl) 101st Med Regt	^U D (AMB)  101
Co E (Amb, Mtx) 101st Med Regt	E (AMB)  101
Co G (Hosp) 3d Med Regt	G (HOSP)  3
1st Bn (Coll) 1st Med Regt	1 (COLL)  1
2d Bn (Amb) 1st Med Regt	2 (AMB)  1
3d Bn (Hosp) 101st Med Regt	3 (HOSP)  101
3d Med Regt	 3

*Optional

Vet Tr 1st Med Sq



SYMBOLS

101st QM Regt (Trk-Corps)



101 trk-corps

901st Vet Conv Hosp



901 conv hosp

1st Bn 101st QM Regt (Trk-Corps)



1(SERV) 101 trk-corps

Hosp Tn



2d Bn 101st QM Regt (Trk-Corps)



2(TRK) 101 trk-corps

First Army Med Dep



First

102d QM Regt (L Maint)



102 l maint

(9) Chemical Warfare Service.

1st Bn 102d QM Regt (L Maint)



102 l maint

Co C 901st Cml Regt (Mtz)



901

2d Bn 102d QM Regt (L Maint)



2(CAR) 102 l maint

2d Bn 901st Cml Regt (Mtz)



901

First Army QM Serv ..



First

901st Cml Maint Co ..



901 maint

901st QM Regt (Trk-Army)



901 trk-army

901st Cml F Lab



901 f lab

902d QM Bn (L Maint)



902 l maint

(10) Quartermaster Corps.

903d QM Bn (Car) ...



903 car

1st QM Regt



1st Bn 901st QM Regt (Serv)



901 serv

1st Bn 1st QM Regt ..



1

1st Sq 902d QM Regt (Rmt)



902 rmt

Co A 1st QM Regt



1

906th QM Regt (Sep) (Trk-Army)



906 sep trk-army

3d Bn 1st QM Regt ...



3



1

903d QM Bn (O & B)



903 c & b

Co F 1st Q M Regt ...



1

Co A 901st QM Bn (Ldry)



901 ldry

Co S 1st QM Regt



1

Co A 903d QM Bn (GB)



902 g r

2d QM Sq



1

904th QM Bn (Wag) .



904 wag

Tr A 1st QM Sq



905th QM Co (Rhd) ..



905 rhd

Tr B 1st QM Sq



1

1st Plat 901st QM Co (Dep)



901 dep

Tr F 1st QM Sq



1

Army QM Dep



xxxx

I Corps QM Serv



Army Maint Dep













xxxx





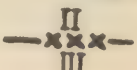

rmt

*Optional.



*Optional.

Rhd {	For 1st Div		rhd	Coll Pt PW 10th Div	
	For I Corps Trs		rhd	Coll Pt Strag L 2d Div	
	For First Army Trs .		rhd	PW Encl IV Corps	
	For gasoline and oil .		rhd	Officer Traffic Control Sta 1st Div	
	DP for CI I Sup		dp	Rr Ech Hq 1st Div	

(11) Ordnance.

3d Ord Co (Maint)		3 maint	Hq or CP III Corps	
901st Ord Co (Am)		901 am	Corps Trs IV Corps	
			Bd between II and III Corps	
			901st Div (Mecs)	

(12) Miscellaneous.

Ry Cen			Special symbols for use in hasty military sketches.	<i>15' wide 8' deep</i>
Am DP		dp	Stream	
R Sta		r sta	Woods	
RP		rp	Brush	
1st Brig Recon Det		1	Cultivated land	
Recon Det No 2 1st Div		2	Area occupied by a unit (2d Battalion 3d Field Artillery)	
			Area occupied by corps troops	

Marginal Information. The following items of marginal information usually appear on standard military maps:

- Harriman index number of the map and the location in the Harriman index of the quadrangle shown on the map sheet. The Harriman index system is explained in TR 190-7.
- Name of the state or states within which the mapped area lies, and the name of the quadrangle or area.
- Its scale, showing both the representative fraction, and mile and yard graphic scales.
- Its orientation with the local magnetic declination and probable annual change.
- Explanation of any symbols appearing that have not been adopted as standard.
- The contour interval.
- Name of the organization which issued the map.
- The date of issue or revision.
- The names of the organizations executing the surveys, date of surveys, and any compilation sources.

- j.* The projection used.
- k.* The horizontal datum.
- l.* The vertical datum.
- m.* The zone of the military grid, including reference to overlap zone, if any.
- n.* The designations of the geographic grid lines.
- o.* The designations of the military grid lines.
- p.* The names of adjoining map sheets.
- q.* An index of the adjoining map sheets (sometimes).
- r.* The filing name.

LOCATION AND COORDINATES

Names. The naming of any named feature is the simplest and fastest method of identification. The names of cities, towns, rivers, lakes, mountains, woods, and similar features are invariably shown on maps. Military maps endeavor to show the names of *all* named features, particularly roads, hills, woods, and even farm houses, when known, further to facilitate identification and location. Because of their military importance the accurate identification of hills and of road junctions is especially desirable. On military maps, hills and road junctions are often given numbers for identification. The numbers so selected are the elevation of the feature in feet, and thus serve the dual role of identification and of conveying topographical information.

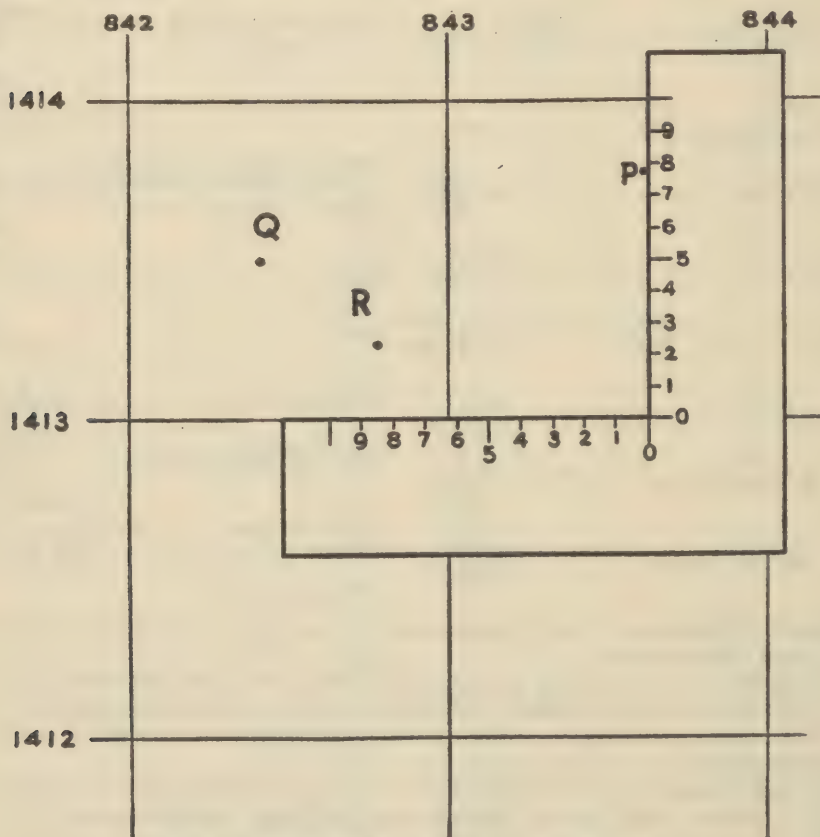


Plate 3. Using the "L" Shaped Coordinate Card.

The coordinates of point "P" are (43.63 — 13.77).

Location by Polar Coordinates. To indicate any specific location on a map it is sufficient to name the feature at the desired location, if it has a name. When the feature in question has no identifying name or number itself, it may be identified by giving its *distance* and

direction from some close-by feature that is named. Thus (see Plate 1) it is sufficient to say, "Road junction one-half mile south of MILLDALE," or, "Orchard just east of R. WILLIAMS, JR.," to identify the features in question. If greater accuracy is needed because of difficulty in describing the feature, the distance may be accurately measured in yards and the direction given in terms of azimuth. This is called the "polar coordinate" method of indicating location.

Location by Grid Square. To facilitate the reading of military maps a grid system is printed thereon. The grid is a series of horizontal lines (known as the *x*-grids) and vertical lines (known as the *y*-grids) spaced 1000 yards apart. These lines are numbered in one series from left to right, and in another series from bottom to top. The combination of these horizontal and vertical lines is known as the "military grid," and they divide the map into 1000-yard squares. Any square can be indicated by giving the numbers of the two grid lines that form the beginning (west edge and south edge) of the square. *The left-to-right reading is always given first, and the bottom-to-top reading last.* In Plate 1 the vertical grids are numbered at the top and are 40 to 42, inclusive; the horizontal grids are numbered on both sides of the sheet and are 15 to 19, inclusive. To indicate location of features on maps of unfamiliar territory, much time is saved by indicating the feature and the grid square in which the feature is found. This reduces the amount of searching to an area 1000 yards square. The road junction and the orchard identified by polar coordinates in the preceding paragraph could have been identified, as follows, by the grid-square method.

"Road junction (41-17)."

"Orchard (42-19)."

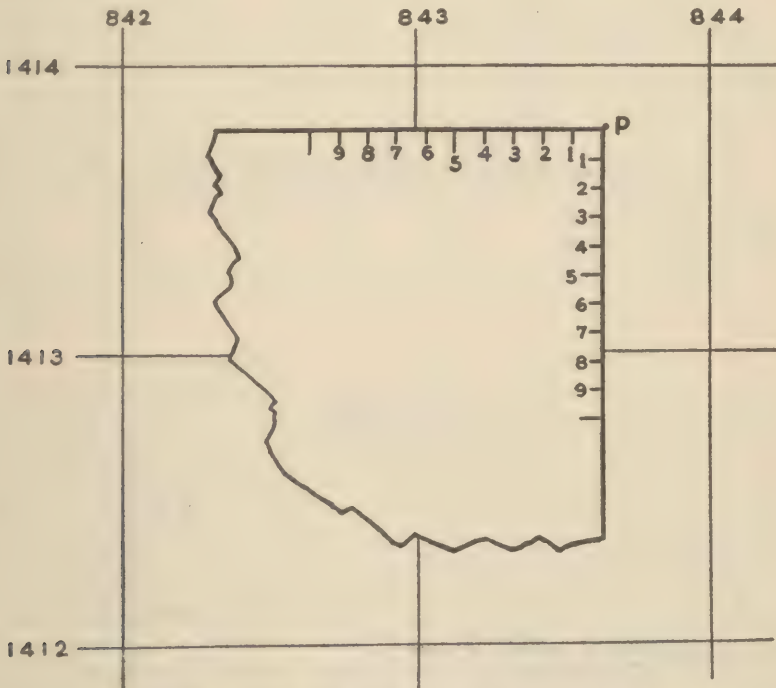


Plate 4. Using the Rectangular Coordinate Card.
The coordinates of the point "P" are (43.63 — 13.77).

Location by Grid Coordinates. It is frequently necessary to give the location of some feature with great exactness, or to indicate a point on the side of a hill, or in an open field. This is done by indicating the exact position within its proper grid square at which the point occurs. For example, the road junction in Plate 1, used in previous examples of location, appears to be about nine-tenths of the distance across its grid square, reading

toward the right from the 41 grid, and about five-tenths of the distance up from the 17 grid. Its grid coordinates therefore would be expressed (41.9—17.5). Coordinates are always written as two figures, separated by a dash and inclosed in parentheses as above. The left-to-right reading is always given first, followed by the bottom-to-top reading, which can be remembered through the key phrase, "READ RIGHT UP." The interpolated figures showing position within the grid square are shown as decimals, following their key grid (as .9 follows 41, and .5 follows 17, above). They can be read to tenths or to hundredths, according to the accuracy desired. Since the squares measure 1000 yards on a side, a reading to tenths (one decimal) gives location to a 100-yard accuracy, while a reading to hundredths (two decimals) gives an accuracy of ten yards. When the grid line numbers run into several digits, it is customary to drop all but the last two digits of the *x* and the *y* grids. For example, grid number (1941—2117) ordinarily would be written (41—17).

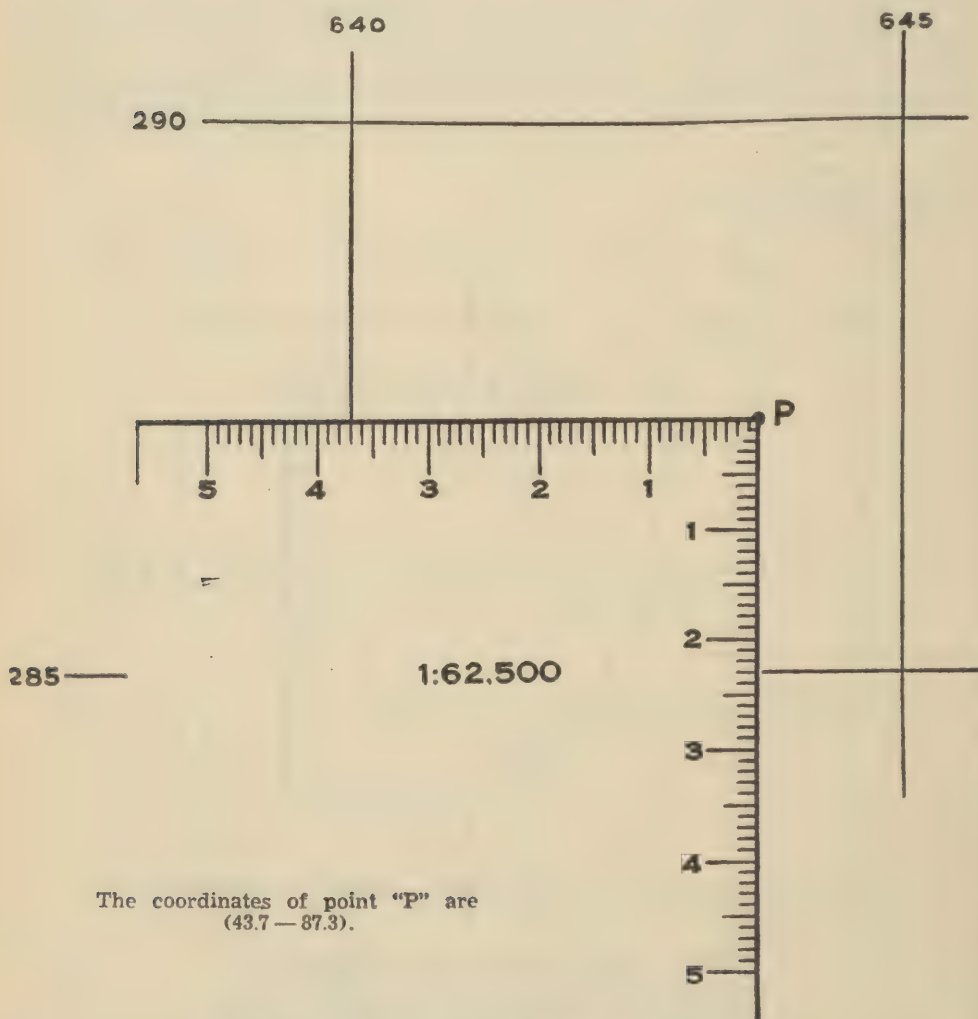


Plate 5. Reading Coordinates on the 5000-Yard Grid.

The Coordinate Card. The reading or plotting of grid coordinates is greatly facilitated by the use of the coordinate card. This card is, in effect, a double scale that can be placed on the map and by means of which both the horizontal and the vertical inter-

polations can be made at one time. There are two types of coordinate cards in general use. One of them is "L" shaped, and the other is rectangular. The manner of using the cards is similar and is shown in Plate 3 and Plate 4.

In both cases, the sides of the cards must be parallel to the grid lines when used. The cards are divided into tenths, and when read to the nearest graduation will give a reading to one decimal, or to a tolerance of 100 yards. When readings to two decimals, or to ten yards, are desired, the graduations are further subdivided into tenths, by inspection.

Coordinates on the 5000-Yard Grid Maps. The smaller scale maps, such as the tactical map (1:62,500), often show every fifth grid line only, thus dividing the map into 5000-yard squares. In indicating location by the "grid-square" method it is sufficient to indicate the squares as they appear on the map. To indicate exact location by the grid coordinate method, however, it is necessary to allow for the intermediate 1000-yard grids that are omitted from the map. For this purpose a special coordinate card is used, dividing the 5000-yard unit into five 1000-yard divisions for the missing intermediate grids, and further subdividing each of these 1000-yard units into tenths (or 100-yard units). Such a coordinate card and its method of employment is shown in Plate 5.

DISTANCE AND TIME

The Graphic Scale. One of the most important uses of the map is to determine distances between points on the ground. This is done by means of a map scale, thus the basic data found on all military maps includes a scale, which consists of one or more lines divided into equal divisions, and each division marked with the distance which it represents on the ground. These are the *graphic scales* and are used for the measurement of distances. There will be one such scale graduated into mile units for use in computing data needed for marches and movements. There will be another such scale graduated to permit direct measurements in terms of yards for the computation of ranges, depths, and frontages. (See Plate 6). On many maps, an additional graphic scale will be shown graduated to permit readings in kilometers and meters (an aftermath of having fought the World War in Europe). Each scale consists of a *primary scale* divided into convenient major divisions of ground distance, and an *extension* at the left consisting of one of the major divisions subdivided into tenths or other appropriate fraction.

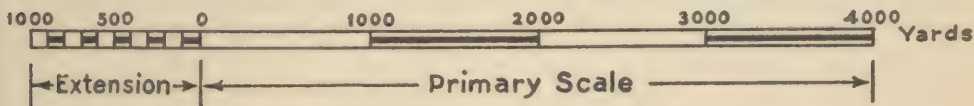


Plate 6. A Graphic Scale for Measurements in Yards.

Measuring Distance on the Map. The graphic scales are a printed portion of the map, and therefore cannot be moved around on the face of the map, as a ruler would be for example. A straight distance on a map is measured by laying the edge of a strip of paper along the line to be measured, and marking thereon *ticks* or short straight marks opposite the two points that form the limits of the line. The distance between these ticks corresponds to the map distance between the points. To determine the ground distance carry the marked paper down to the proper graphic scale. Place the right-hand tick accurately on that division of the primary scale which forces the other tick to fall within the *extension*. Read the total number of the primary divisions at the right end, and add the number of extension graduations shown at the other end. The combined reading will be the ground distance of the line measured. The distance between the two houses (center to center) in Plate 7 is 3000 yards of primary scale plus $4\frac{1}{4}$ divisions of the extension, a total of 3425 yards.

Measuring Distance by Road. Road distance between two points, because of the bends and turns of the road, seldom can be measured in one operation as explained above. It is necessary to break the route to be measured into a succession of straight parts, commonly called *legs*, plotting them in sequence direct from the map onto the edge of a strip of paper. (See Plate 8). The combined distance, so plotted, is then measured on the graphic scale (always in miles for marches and movements) as described in the preceding paragraph.

The Representative Fraction. The scale of a military map is indicated on the map not only by the graphical scale but also by a fraction called the "*representative fraction*" or "*RF*". This fraction or symbol expresses mathematically the relation which distances on the map bear to the distances on the ground. Thus in the case of a map bearing the symbol $1/20,000$, any distance measured on the map is one-twenty thousandths of the same distance

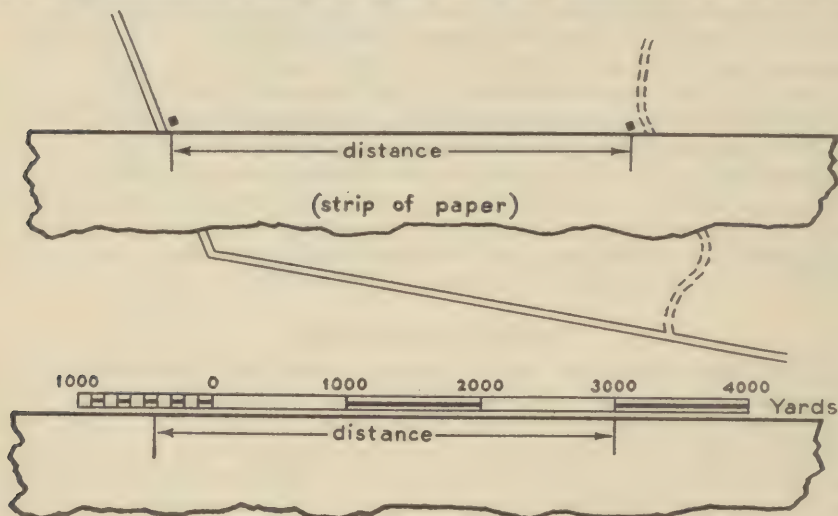


Plate 7. Measuring a Distance on a Map.

on the ground; or, any distance on the ground would be twenty thousand times the same distance on the map. It ($1/20,000$) is also in effect, a statement that one unit of distance on the map corresponds to 20,000 units of distance on the ground. In the absence of any graphic scales, a ground distance can be determined from the representative fraction by multiplying the map distance by the denominator of the RF of the map. Various maps have different scales, such as $1/10,000$, $1/63,360$, etc. Any representative fraction is a statement of the ratio of size between corresponding map and ground dimensions.

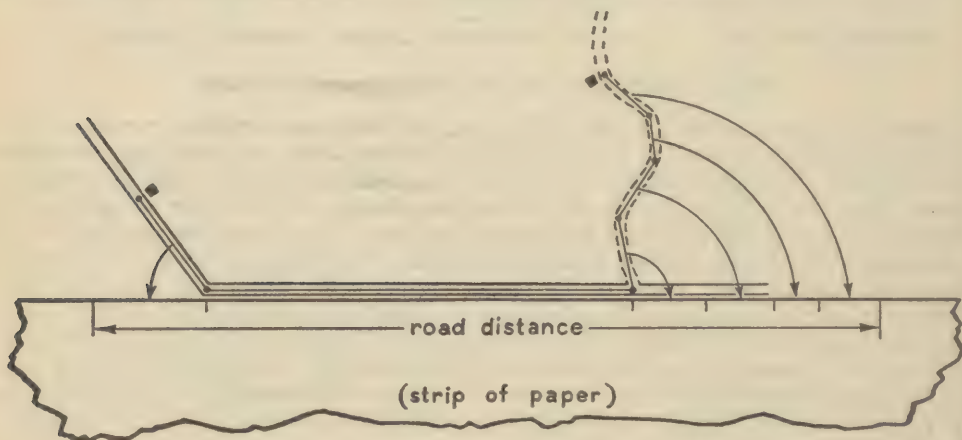


Plate 8. Measuring Road Distance.

Determining the Representative Fraction. If the representative fraction is not shown on the map, due either to omission or to mutilation, it can be determined in the following manner. Select a line on the map that can be accurately located on the ground. Measure the line on the map and then measure the same line on the ground by tape, chain, pacing, or any acceptable method. We now have two measurements both pertaining to the same

line—one on the map in inches and one on the ground in yards or miles. Reduce the ground measurements to inches, so that *both measurements are in the same unit* and therefore can be compared. Reduce the equation so that the map side thereof is 1. For example, the distance between two houses measured on the map is 2.82 inches and measured on the ground is 1580 yards.

Map	Ground
2.82 inches on the map	= 1,580 yards on the ground
(Reduce to common terms)	
2.82 inches on the map	= 56,880 inches on the ground
(Reduce to a map value of "1")	
1 inch on the map	= 20,170 inches on the ground
(or)	1 = 20,170, the RF of this particular map.

If other maps of the same area are available, the ground distance could be secured from them instead of by measurement on the ground itself.

Words and Figure Scales. Scales may be expressed in words and figures, such as: "One inch equals one mile," which means that one inch on the map represents one mile on the ground. Such a scale can be converted to a representative fraction by reducing both sides of the equation to common terms. The above scale would then be "1 inch = 63,360 inches," and its RF would be written: 1:63,360. Representative fractions are always written with the numerator (map side of the equation) expressed as unity. Therefore a further conversion step may be required in cases such as the following:

"Three inches equals one mile."

$$\begin{aligned} 3 \text{ inches} &= 63,360 \text{ inches} \\ 1 \text{ inch} &= 21,120 \text{ inches} \\ 1 &: 21,120 \text{ (RF)} \end{aligned}$$

Constructing a Graphic Scale. For the purpose of determining distance data from a map, the graphic scale is the only type scale that is convenient to use, and for this reason is often called the *reading scale*. If such a scale does not appear on the map in convenient units, much trouble is saved by constructing one immediately. A graphic scale can be constructed for any map whose representative fraction is known or can be determined. For example, assume that a map shows no graphic scale, but shows a representative fraction of "1:20,000." It is desired to construct a graphic scale to make readings in terms of yards. The 1000-yard unit is the most convenient to use. 1000 yards equals 36,000 inches. Our problem can be stated, "Since 1 inch on the map is known to represent 20,000 inches on the ground, then how many inches on the map will it take to represent 36,000 inches on the ground." The above can be worked out as a problem in ratio and proportion, as follows:

$$\begin{aligned} 1 : 20,000 &:: X : 36,000 \\ 20,000 X &= 36,000 \\ X &= 1.8 \end{aligned}$$

A line of convenient length is then drawn, and divided into divisions of 1.8 inches each, each of which will represent 1000-yard units of ground distance. The left division should be subdivided into tenths, by any convenient method, for the extension of the scale.

Converting Distance to March Time. The computation of the time required for troop movements is an essential item of military information obtained from maps. The rates of march of various types of troop units is known from experience. Foot troops are habitually computed as traveling, by road, by day, at a rate of $2\frac{1}{2}$ miles per hour. The distance to be marched, divided by the rate of march, will give the time required for the movement.

Example: A dismounted unit is to march from A to B. How long will it take? Points A and B are located on the map, and the road distance measured. It is found to be 11.4 miles. The rate of march is $2\frac{1}{2}$ mph.

$$11.4 \div 2.5 = 4.56$$

The march will therefore require 4.56 hours. March time is always expressed in hours and minutes. All fractional parts of a minute are carried to the next full minute. Four and 56/100 hours ($\times 60$) equals 4 hours and 33.6 minutes. Therefore the above march will require 4 hours and 34 minutes travel time.

Converting March Time to Distance. The distance that troops can move during a known elapsed time is an item that must frequently be determined. The time in hours multiplied by the rate of march will give the distance.

Example: A dismounted unit left A marching toward B at a known time. Where is the unit now? The rate of march is $2\frac{1}{2}$ mph, and the troops have been marching for 3 hours and 15 minutes.

3 hours 15 minutes = 3.25 hours

3.25 (elapsed time) $\times 2.5$ mph (rate) = 8.125 miles (distance).

The unit would be 8.125 miles from A. This distance is plotted on the edge of a strip of paper by means of the miles graphic scale, and is then scaled off along the road from A toward B.

Time-Distance Scales. When much work in determining distance and time of marches and movements must be done, it is of great convenience to construct a time-distance scale. Such scale is in reality a graphic scale divided into time units instead of into distance units. Such a scale for use in connection with movements of foot troops ($2\frac{1}{2}$ miles per hour) could be constructed as follows. From the miles graphic scale of the map draw a line to represent $2\frac{1}{2}$ miles which will therefore represent one hour of travel. Divide the line so drawn into twelve equal parts, each of which will then represent the distance covered in five minutes of travel time. To measure any given time-distance, use it exactly as a graphic scale, the full divisions representing full hours, and the subdivisions indicating the number of minutes of travel time. The scale might be divided into sixty parts, each representing one minute of travel. A time-distance scale for any other rate of travel could be constructed in a similar manner.

DIRECTION AND AZIMUTHS

Direction, General. The established geographic terms, *north*, *south*, *east*, *west*, and *northeast*, *southwest*, etc., are used by the military to indicate general direction. Also the relative terms *right* and *left*, *front* and *rear*, are sometimes used in the field when they will serve the purpose. They are used in their generally accepted sense, except that the relative terms are based upon the direction that the unit is facing, rather than the in-

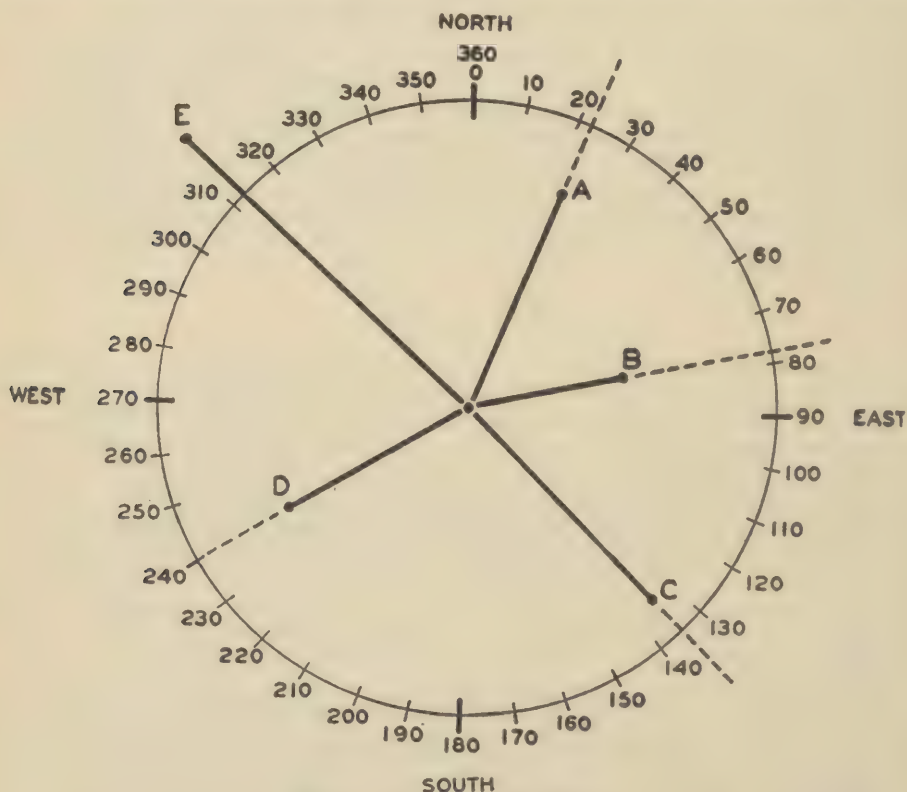


Plate 9. The Azimuth Circle.

The azimuths of A, B, C, D, and E are 22° , 78° , 135° , 240° , and 313° , respectively.

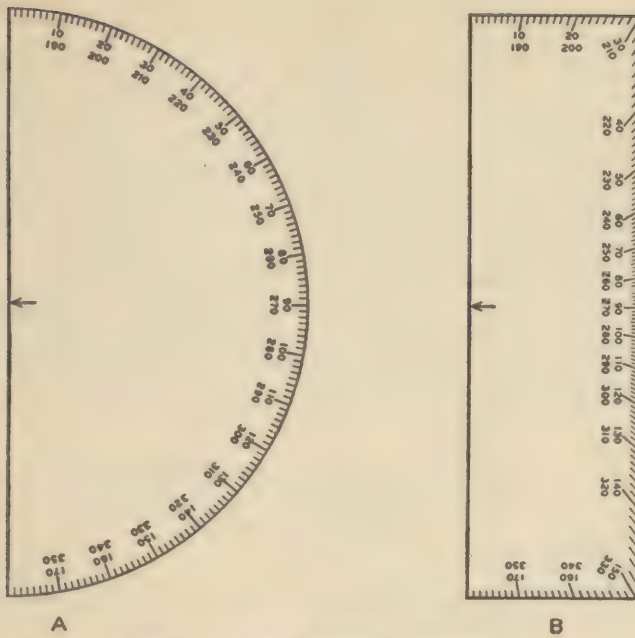


Plate 10. Map Reading Protractors.
A—Semi-circular Protractor. B—Rectangular Protractor.

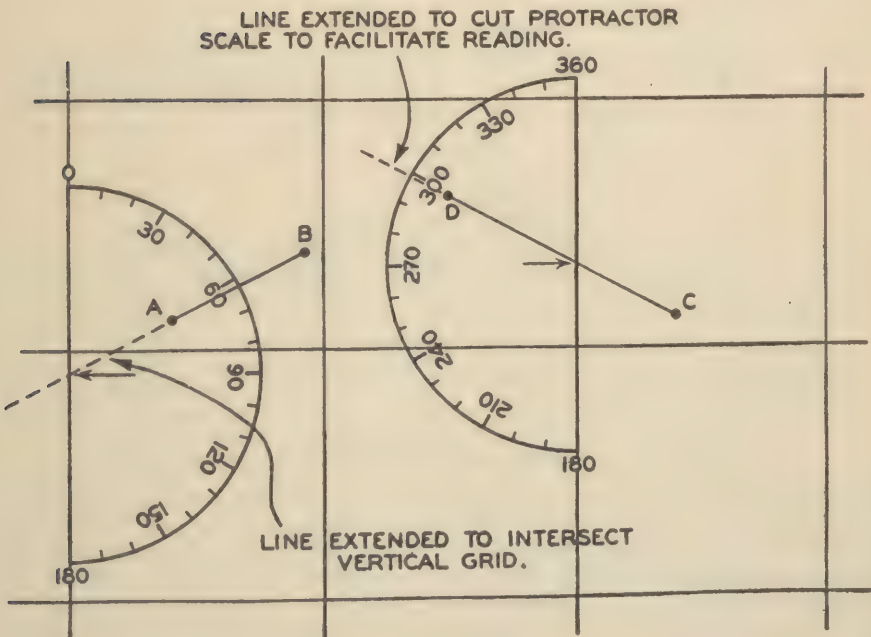


Plate 11. Measuring Map Azimuths.
The azimuth of the line A—B is 63°; of C—D, 298°.

dividual; and, in combat, the direction of the enemy is always *front*. When a more accurate designation of direction is necessary the azimuth method is used.

The Azimuth Circle. The azimuth method is the established method of indicating direction in military map reading. The observer, or the point from which the direction is initiated, is presumed to be at the center of an imaginary horizontal circle (see Plate 9). This circle is divided into 360 units of circumference measurement, called *degrees*. The degrees are numbered in a clockwise direction, the zero point being at the north, which automatically places the 90°-point exactly east, the 180°-point south, and the 270°-point west. The 360°-point will coincide with the 0°-point and be north. Direction by the azimuth method is expressed by giving the number of the degree on the circle at which a line drawn from the initial point through the point desired will pass.

The Protractor. Map azimuths are read with a protractor. Two standard types of protractors, semicircular and rectangular, are shown in Plate 10. Each protractor represents one-half of an azimuth circle. Two scales are usually shown, one reading from 0° to 180° for reading azimuths in the first half of the circle, and another showing readings from 180° to 360° for azimuths in the second half of the circle.

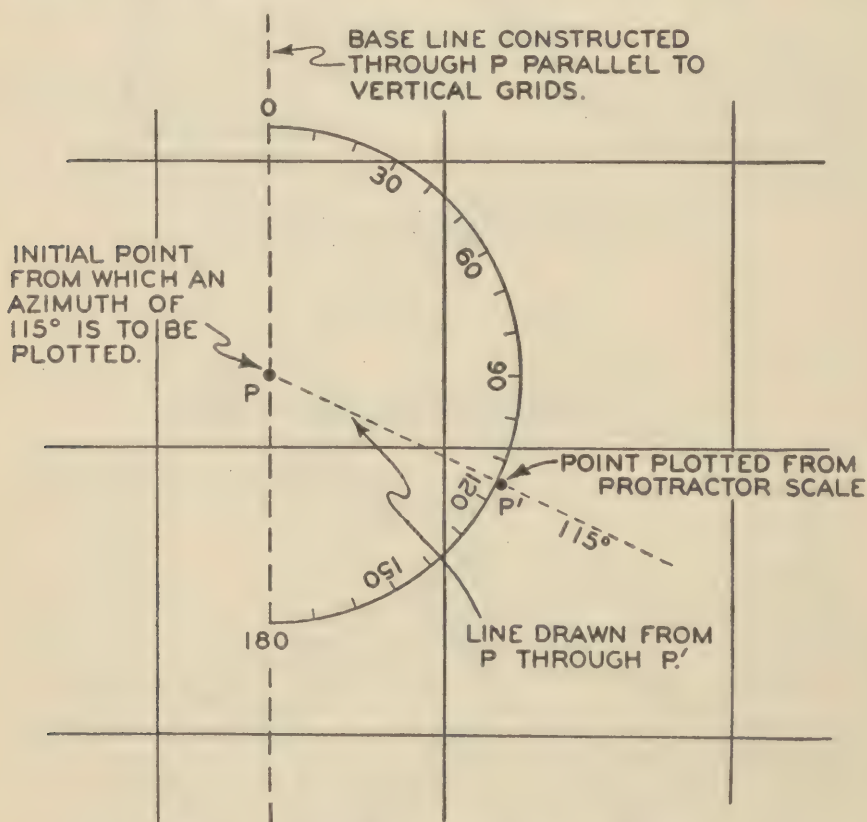


Plate 12. Plotting an Azimuth (115°) On a Map.

Measuring a Map Azimuth. To measure the azimuth of a line on a military map, extend the line to be measured, if necessary, until it crosses a vertical grid. (See Plate 11). Place the central index point of the protractor upon the intersection of the line with the vertical grid and register the base line of the protractor accurately on the grid line. If the direction of the line to be measured is to the east of the grid line, the reading is taken from the 0°-180° scale. If the direction of the line is to the west of the grid, the protractor is inverted, and the reading made on the 180°-360° scale.

Plotting an Azimuth On a Map. To plot an azimuth on a map, construct a vertical

base (zero) line through the point at which the azimuth originates. On a gridded map such a line would be parallel to the vertical grid lines. Register the protractor with its base line superimposed on the plotted line, and with its central index on the point at which the azimuth originates. Mark the point opposite the proper reading on the protractor scale and draw the line as shown in Plate 12.

Back-Azimuth. Every line has two azimuths, depending on the direction in which the measurement is made. On Plate 13 the azimuth of the line O-A is 60° . The azimuth of the same line measured from A back toward O (A-O) is 240° . This is the back azimuth of O-A. It is also the same as the azimuth of the line O-A', which is the extension of the line A-O. The back-azimuth of any line varies from its direct azimuth by exactly 180° , and so whenever the azimuth or the back-azimuth of a line is known its other azimuth can be determined by subtracting or adding 180° . It is essential in dealing with azimuths always to indicate the direction of the measurement (O-A or A-O) and to specify *azimuth* or *back-azimuth*. On Plate 13 the azimuth of the line O-B is 290° ; its back-azimuth is 110° .



Plate 13. Back-Azimuths.

Intersection and Resection. *a.* An unknown point can be located by its azimuth and distance from some known point. (See polar coordinates.) A point can also be located if its direction from two points is known. For example, a new house has been built, and it is desired to enter it on the map. (See Plate 14.) The azimuth to the house is determined from the road junctions 482 and 516, and found to be 112° and 30° , respectively. These azimuths are then plotted on the map and their intersection is the location of the house. This is known as *intersection*, and is very useful when swamps, woods, or defiladed areas make measurement of distance impracticable.

b. An observer who does not know his location can locate himself if he can get azimuth readings to two known points. In the above example presume the observer to be at the house, taking readings to the road junctions. In this case the readings would be 292° and 210° respectively. These readings *toward* the road junctions are then converted, mathematically, to their back-azimuths, which give the azimuth readings *from* the road junctions, and so can be plotted as in *a* above. This is known as *resection*, and is the same process as intersection, except that the original readings are taken at the *unknown* point, and must be converted to back-azimuths before they can be plotted from the *known* points.

The Mil. Fire direction of artillery, machine guns, and other auxiliary weapons requires greater accuracy of direction than is possible with degree readings. For this purpose the military have devised an azimuth circle divided into 6400 units of measurement known as *mils*. (See Plate 15). Protractors and compasses are provided graduated in mils so that readings can be made direct in mil units without necessity for conversion. The method of reading and plotting azimuths in mils is the same as when using degrees.

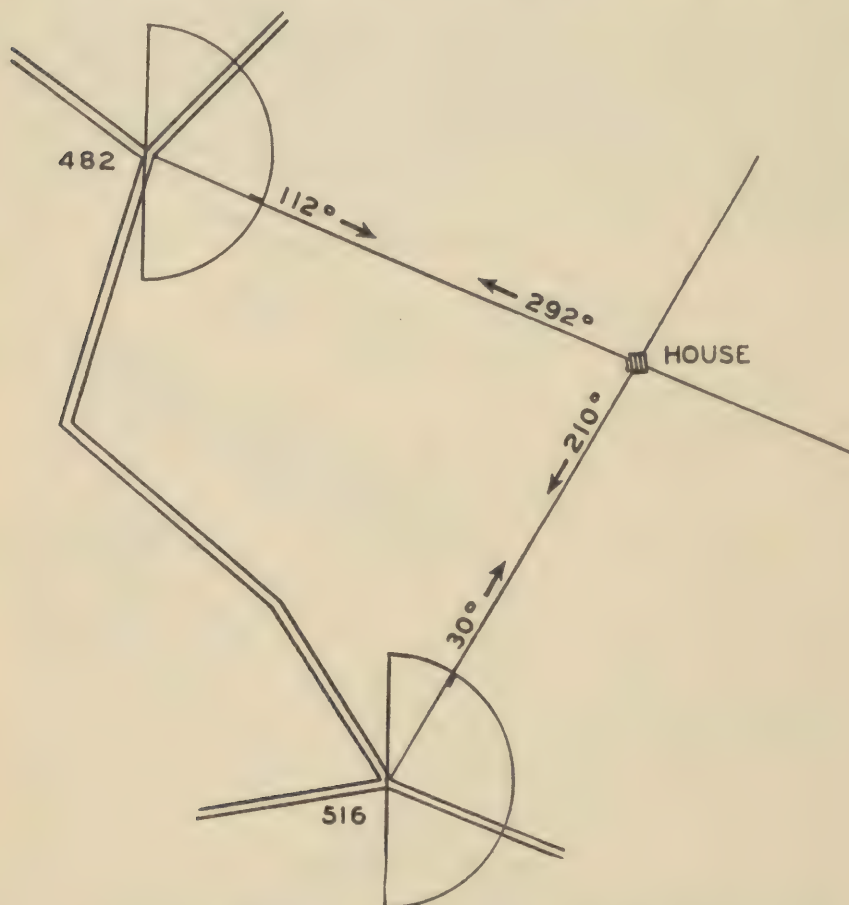


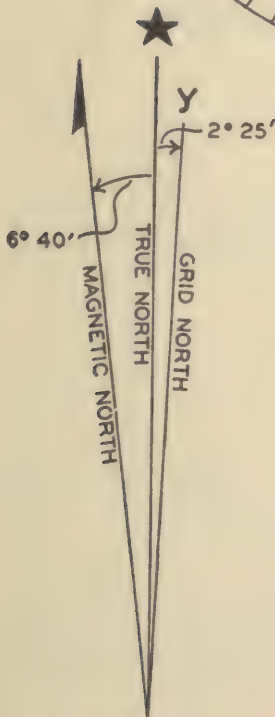
Plate 14. Intersection and Resection.

The azimuths from the road junctions to the house being known, their plotting gives the location of the house. Or the azimuths from the house to the road junctions being known, they can be converted to back-azimuths and plotted with the same result.

Declination. Direction is read on military maps by means of the grids, and such readings are called *grid azimuths*. Direction in the field is read with a compass whose magnetized needle points toward the north magnetic pole, and such readings are called *magnetic azimuths*. The grid north and the magnetic north do not coincide with the true north, nor with each other, except in very rare instances. It is necessary, therefore, to make an adjustment in order to use in the field azimuth data secured from the map, and *vice versa*. Military maps show the direction and the amount by which the grid north and the magnetic north diverge from the true north. These are known as the *grid declination* and the *magnetic declination* respectively. Plate 16 shows a typical orientation symbol as found on military maps. The following declination data is shown by this symbol in Plate 16:



Plate 15. The Mil Azimuth Circle.
The azimuth of A is 2140 mils.



APPROXIMATE
MEAN DECLINATION
1935
ANNUAL MAGNETIC CHANGE
INCREASE 3'.

**Plate 16. Map Orientation
Symbol.**

Magnetic declination: 6° 40' West (in 1935).
6° 52' West (in 1939).
Grid declination: 2° 25' East.

The Grid-Magnetic Azimuth Adjustment. The three lines, grid north, true north, and magnetic north may occur in any one of several arrangements. The amount and direction by which the grid north varies from the magnetic north is the correction data needed in map reading. The amount of this adjustment may be the sum of the declinations, or in other cases may be the difference of the declinations. Both the amount and the direction can be determined from the diagrammatic plotting of the orientation symbol, and the values given thereon. First study the symbol and determine the mathematical amount of the variation between the grid and the magnetic north lines as shown. (See Plate 17). Then note whether the magnetic arrow lies *inside* (right) or *outside* (left) of a clockwise azimuth measurement from the grid line. If it lies inside a clockwise measurement, the magnetic azimuth will be less than the grid azimuth by the amount determined. If outside (left), it will be greater than the grid azimuth. Plate 17 shows a diagrammatic method of determining the grid-magnetic adjustment for three separate instances.

ELEVATION AND RELIEF

Relief. Relief, or topography, are terms used to designate the vertical irregularities of the ground, such as the hills, ridges, valleys, and depressions. The presence or absence of such terrain features, and their location, size, and arrangement are very essential items of military information because they greatly affect the disposition of troops and the tactical plans of the commanders. Therefore, a military map must show the relief of the area, and a commander must be able to secure this information from his map. Since the map itself is flat, special devices are necessary to show relief. One system is to color the

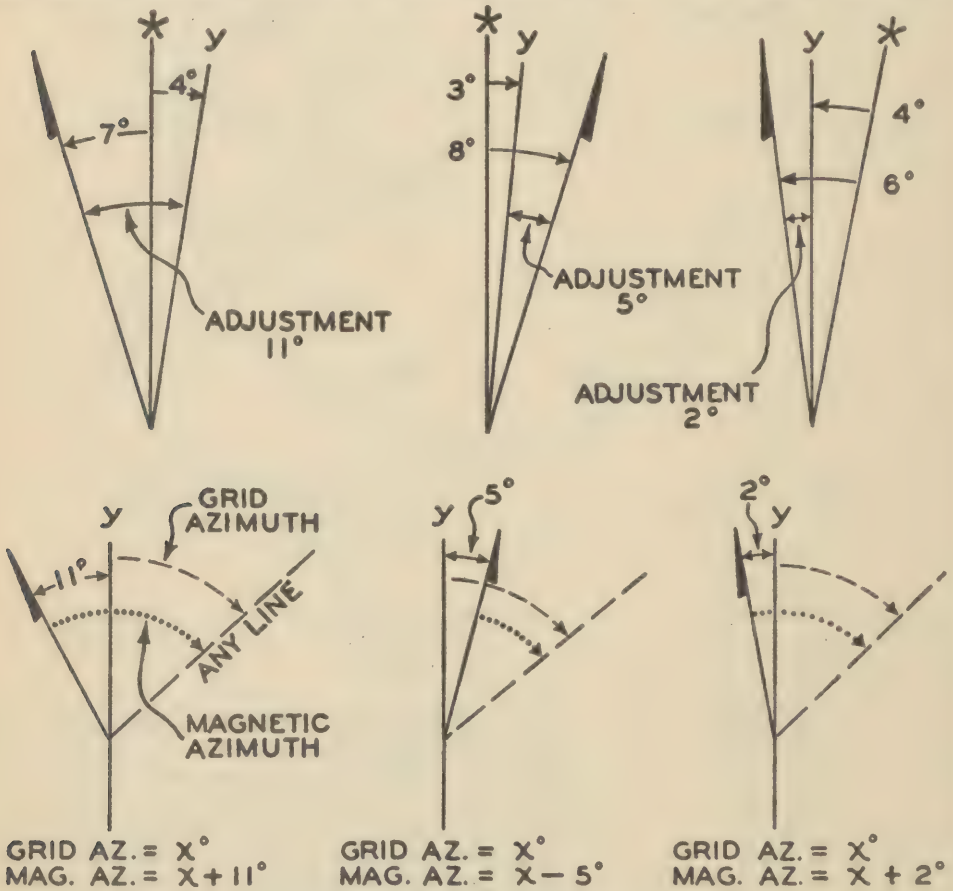


Plate 17. Determining the Grid-Magnetic Adjustment.
(Angles exaggerated)

high ground with various shadings of color to indicate different *layers* of elevation. This system is used on the air navigation maps, and on some small scale maps. Another system is to use *hachures* or small fine lines to *picture* the ridges and hills. Neither gives reliable elevation data for specific points on the terrain. The system now used on all our standard topographic maps is the contour system.

Contours. Contours are a map device for depicting the relief of an area by means of lines drawn on the map. Each contour line represents a given elevation or is a line joining all points of the same elevation. The elevation that each contour represents is shown thereon (sometimes on every fifth contour only), the elevations being based on mean sea level. The seashore line itself would be the base contour line. Thereafter there would be a separate contour for each successive gain of elevation of 10 feet or of 20 feet, depending on the scale of the map and the contour interval (vertical interval or VI)

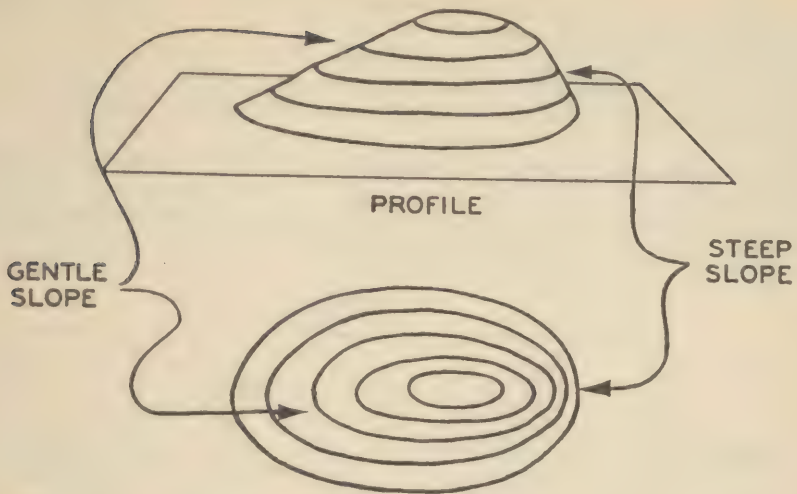


Plate 18. Contour Arrangement.



Plate 19. Contours of Ground Forms.

The top figure is a sketch of the ground.

The bottom figure shows how this ground would be indicated on a contoured map.

selected. Each contour follows the line that would be the new shore line if the water level were raised to its particular elevation.

The following are some of the characteristics of contours:

- a.* A contour cannot begin or end. It must eventually close upon itself.
- b.* A contour cannot join or cross another contour. (Exception in vertical and overhanging cliffs.)
- c.* All points on a contour have the same elevation, and only points on the same contour have that elevation.
- d.* In order to "cross" a ridge, a contour must pass around the outer end of the ridge (like a road of 0 grade passing around a hill) and in so doing it assumes a "U" trace or shape.

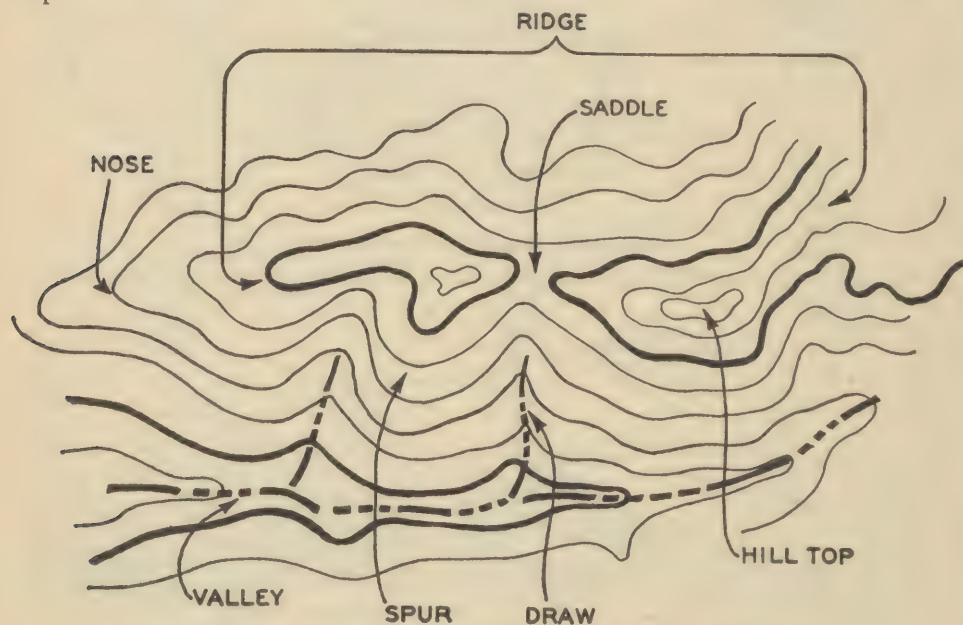


Plate 20. Contours of Characteristic Ground Forms.

e. In order to "cross" a valley, a contour must follow up the valley, cross the stream, and then come back again on the opposite side, and in so doing it assumes a characteristic "V" trace or shape.

f. The steeper the slope, the closer the contours; and conversely, the gentler the slope the wider apart the contours.

g. Evenly spaced contours occur on uniform slopes. Irregularly spaced contours occur on uneven slopes.

h. Closed contours indicate hilltops (sometimes depressions—rare).

i. A contour always runs at right angles to the direction of the steepest slope.

j. In map reading it is presumed that the ground between two adjacent contours has a uniform slope, though this may not be true in fact.

Determining Elevation. *a. Of a point on a contour.* To determine the elevation of a point on a map that happens to fall on a contour, search along the contour line for its stated elevation. This will be the elevation of the point. On most maps every fifth contour is accentuated for convenience, and often only every fifth contour is numbered. In such cases, note the vertical interval shown on the map, the elevation of the nearest numbered contour, and the number of intervening contours, and compute the elevation of the required contour. The elevation of point *A* on Plate 21 is 580 feet.

b. Of a point on a slope between contours. To determine the elevation of a point on a slope between contours, first determine the elevation of the two contours between which

the point lies. Then note the relative position of the point with respect to these two contours, and along the line of the steepest slope, which is the line perpendicular to the contours. Interpolate the distance in terms of elevation. Point *B* on Plate 21 is 594 feet.

c. Of a point above the top contour. In the case of a point falling within the top contour of a hill or ridge, only an approximation is possible. The elevation of point *C* on Plate 21 must be greater than 600, and must be less than 620 feet. Since the top of the hill itself cannot be as great as 620 feet (or the 620 contour would appear), and the point "*C*" is obviously not at the top of the hill, its elevation would be estimated as roughly between 605 and 610 feet.

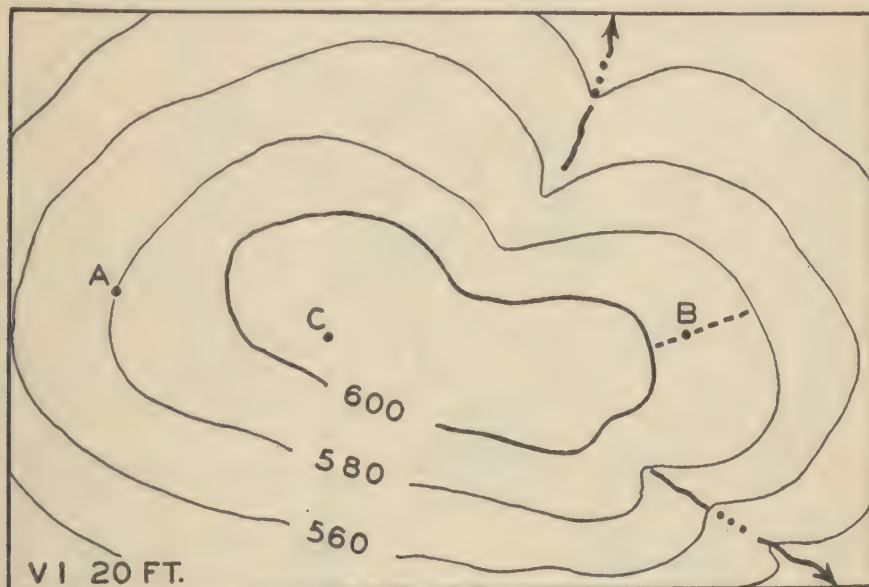


Plate 21. Determining Elevation.

Terrain Structure. The relief of the ground is, with rare exceptions, due to water erosion, or weathering. During the course of geological ages the streams and rivers wash away portions of the earth's surface thereby forming valleys. The more resistant portions do not wash away as rapidly, and remain as hills and ridges. Through the natural working of this process the streams seek and follow the lowest ground available to them, and therefore the drainage net, as shown on the map, is the pattern of the low ground of the area. Between any two adjacent streams there will always be found a ridge or crest, its direction generally bisecting the angle between the streams, and usually centrally located. The tops of the ridges are usually irregular, the high points constituting hills or peaks, and appearing on maps as a succession of closed contours. The basic terrain structure consists of a drainage system, following a characteristic pattern, and a ridge system which conforms to and complements the drainage system. The best way to study the terrain structure of an area is to trace out the drainage system, and then to trace out the ridge system. The exact location and trace of the drainage system is shown on maps by the proper stream conventional signs. The exact location and trace of the ridge system can be determined by tracing along the line established by the hills and ridges as shown by the contours.

Profiles. A valuable method of visualizing the details of relief is by profiling a selected line on the map. The profile gives a cross-section view of the terrain as it would appear on a vertical section through the line being profiled. The vertical scale is greatly exaggerated in most profiles, in order that the details of the relief can be more easily studied. Assuming the scale of the area shown in Plate 24 to be 1:10,000, the relief in the profile has a vertical exaggeration of about ten to one. To construct a profile, a working space (see Plate

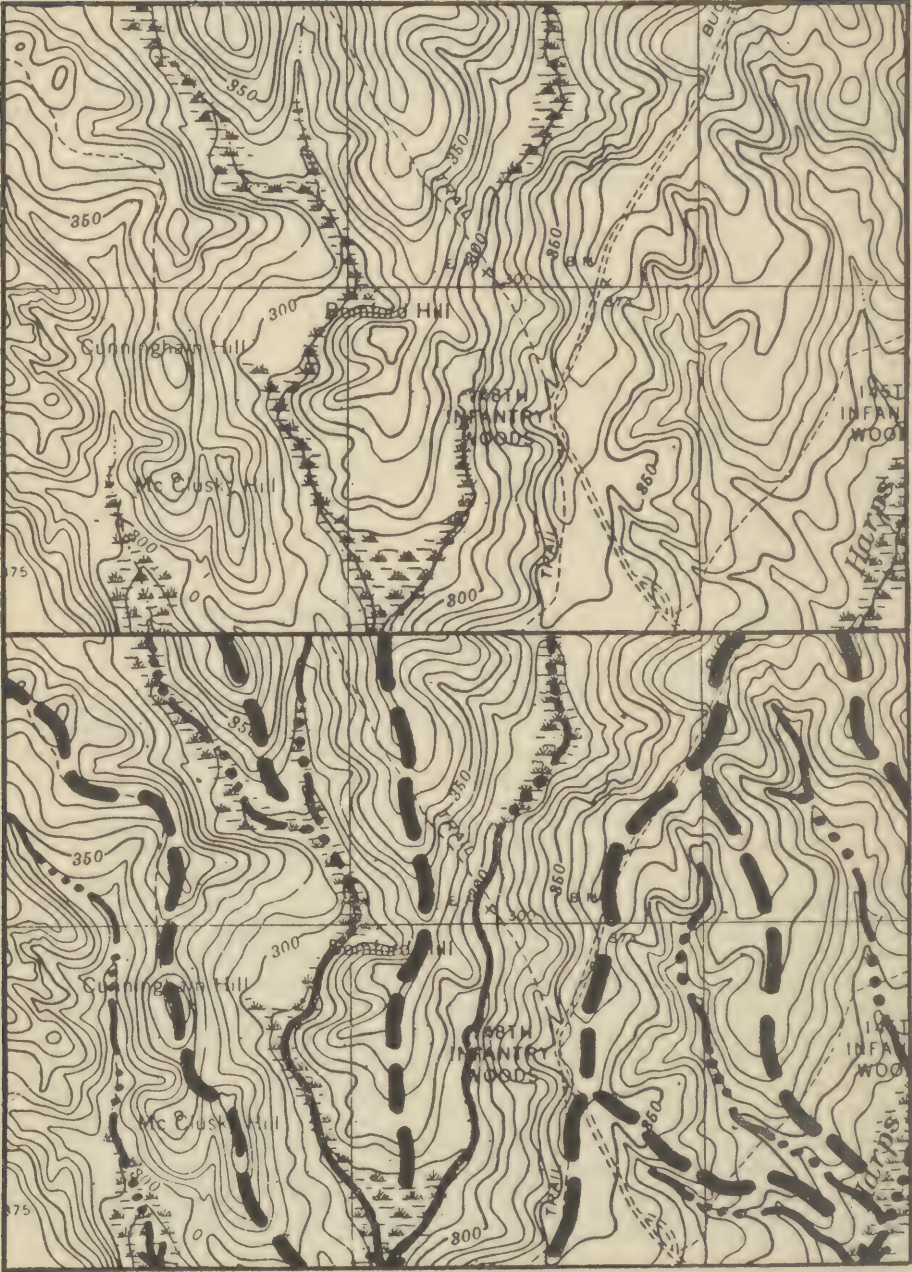


Plate 22. Basic Terrain Structure.

23) is first constructed consisting of equally spaced horizontal lines, each line to represent the elevation of a contour, and the spaces between the lines representing the difference in elevation between two contours. The number of spaces must be sufficient to accommodate the total number of contour intervals between the lowest and the highest point involved in the profile. Lines are numbered in sequence to conform to the contour lines involved. The working space is placed on the map, lines parallel to the line to be profiled. Perpen-

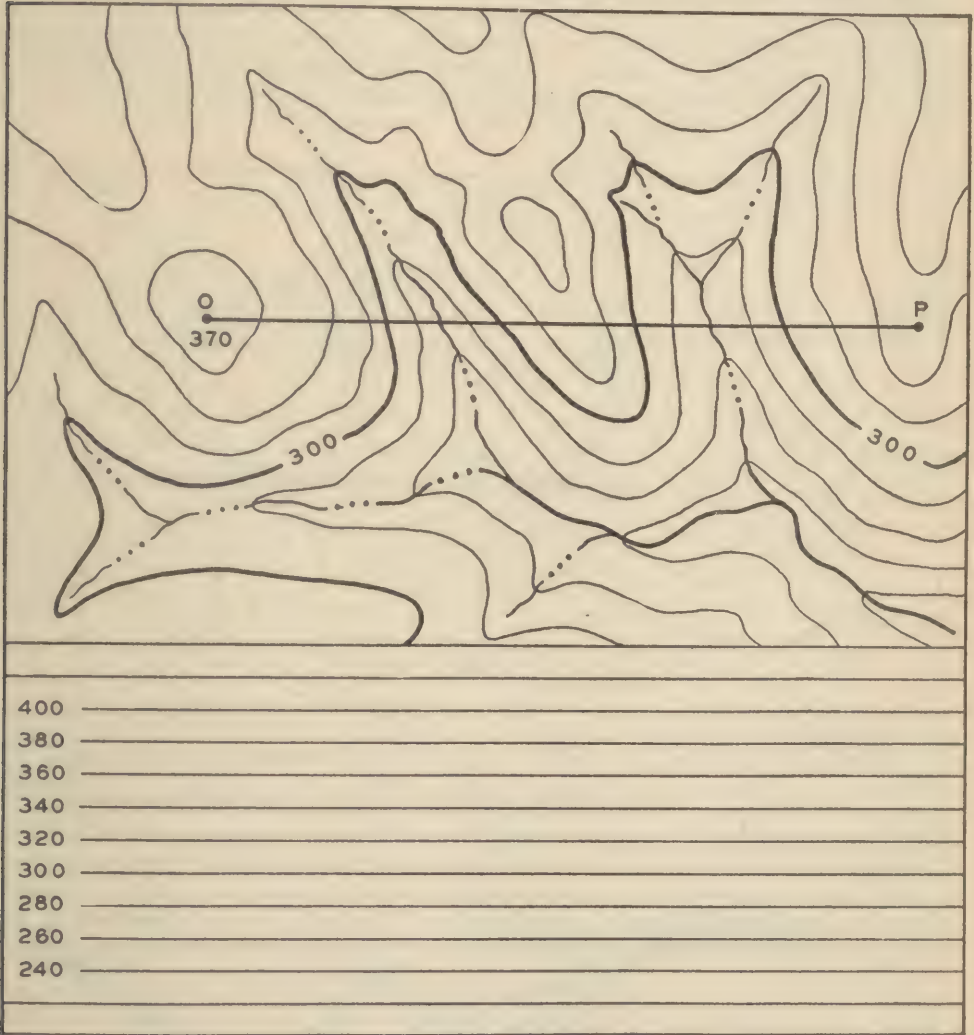


Plate 23. Profile Working Space.

dicular lines are dropped down into the working space from each point where the line (O-P on Plate 24) crosses a contour, a stream line, or a ridge line. This method maintains the proper horizontal spacing of these points, which is essential to the accuracy of the profile. The contour crossing points are plotted on their appropriate elevation lines of the work space. The elevations of the stream and the ridge crossing points are determined by interpolation and plotted accordingly. In Plate 24 they are (reading from O to P) $\frac{1}{2}$ (at O), $\frac{1}{3}$, $\frac{2}{3}$, $\frac{1}{3}$ and $\frac{1}{2}$ of a contour interval, respectively.

The profile is completed by connecting, by straight lines, the points thus plotted.

Visibility. *a. By profile.* Reliable knowledge of the visibility, or lack of visibility of points or areas is very essential to commanders. It greatly affects the location of ob-

ervation posts, the siting of weapons, selection of targets, and may determine the suitability of combat positions. The profile is the most reliable and useful means of determining visibility, because it gives accurate information of what points are and are not visible, the location and the extent of invisible (*defiladed* or *dead*) areas, and from it the actual amount of vertical defilade can be computed for any point. On Plate 24, assume an observer to be standing at O, eyes five feet above the ground, looking toward P. The profile indicates that there are two areas invisible to the observer, and their extent can be plotted back on the map from the profile. The amount of vertical defilade at the second stream can be computed in terms of the vertical intervals of the working space, and found to be approximately 50 feet. The profile also shows that the nearest point to O from which the first stream can be seen (military crest of the east slope of hill O) will be at the 320 contour line (indicated on the profile by an arrow).

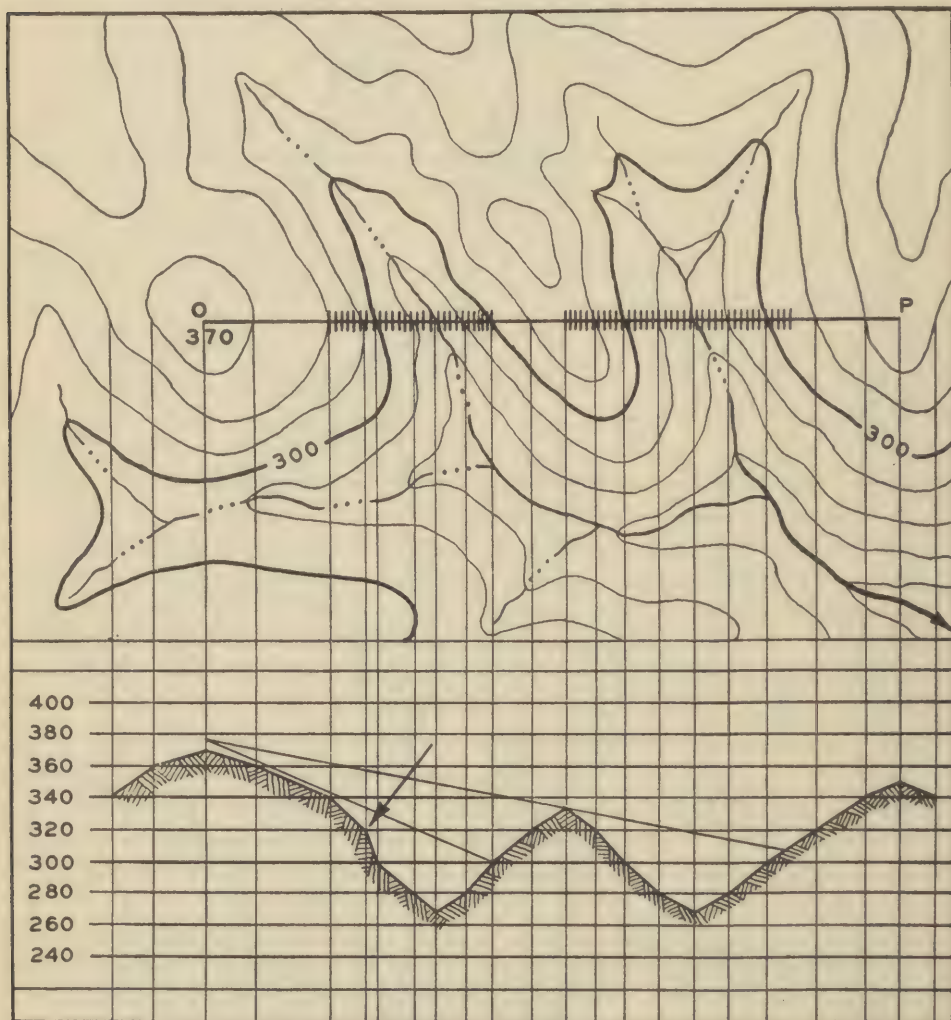


Plate 24. Profile.

The visibility of entire areas, such as the field of view from an observation post, can be plotted on a control map by profiling each of a series of radiating lines and completing the outline of the invisible portions by inspection. (See Plate 25.)

b. By hasty profile. When speed is essential, and the visibility of specific points, only,

is at issue, the necessary information can be quickly determined by plotting on the working space only the points involved. Such points would be the observer, the probable masks, and the points whose visibilities are to be determined. In Plate 26, assuming the visibility of points A and B, only, are at issue, the plotting shown is sufficient to determine that A is visible and that B is not visible from O.

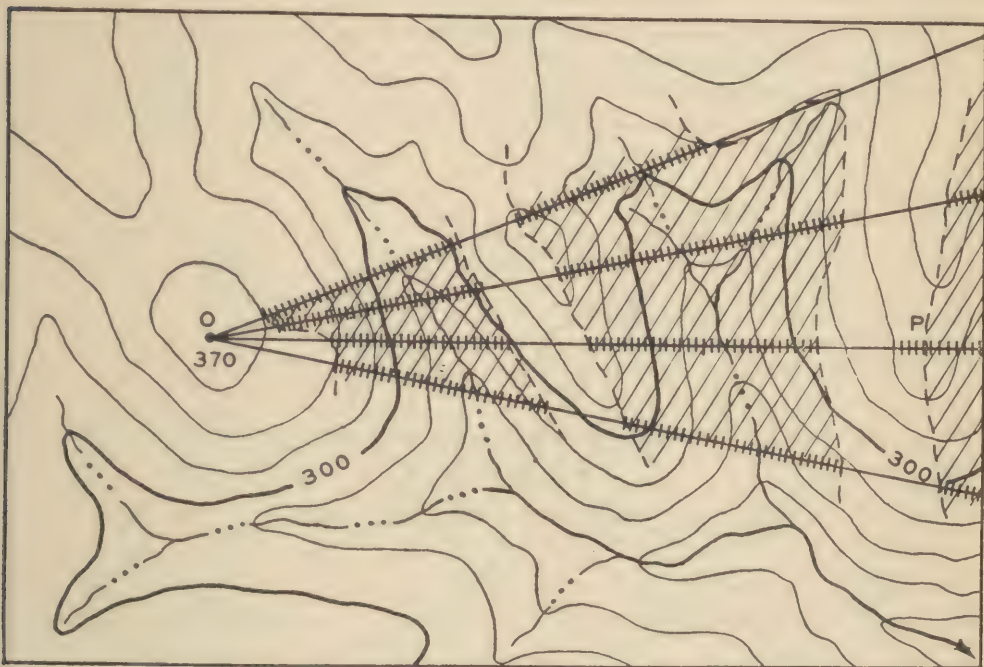


Plate 25. Visibility of Areas.

c. By computation. The visibility of any single point can be determined by calculation. The line of sight from an observer to any point would follow a straight line (if uninterrupted) which would be the hypotenuse of a triangle, the other sides being the distance, and the difference of elevation. These data can be determined by measurement and by calculation. The visibility of point B on Plate 26 could be determined in the following manner (see Plate 27). Measure the distance O to B and O to M in any common unit of measurement (in this case the measurement was made in inches). Determine the difference in elevation between O and B. Stated in simple terms we now know that the line of sight has dropped 87 feet in 3.40 inches of map distance. We can easily determine how much this line of sight will drop in the 2.24 inches of distance from O to the mask, by applying the law of similar triangles:

$$\begin{aligned} 3.40 : 2.24 &= 87 : X \\ X &= 57.3 \end{aligned}$$

Therefore, the line of sight from O to B will have dropped 57 feet by the time it reaches the mask, and will have a theoretical elevation of (375—57) 318 feet. The actual elevation of the mask as shown by the contours is about 332 feet. Therefore, the mask is too high (by 14 feet) to permit observation from O to B.

d. By inspection. Most visibility problems can be solved by inspection. If the intervening mask is higher than both the observer and the point, then there can be no visibility. If it is lower than both the observer and the point, then obviously the point can be seen. The line of theoretical sight, being a straight line, will drop (or rise) one-half the total drop (or rise) in half the distance, one-third in one-third of the distance, three-quarters in three-quarters of the distance, etc. Therefore, by noting the amounts of the differences in elevation of O-P and O-M, and comparing their relation with the relative location of the mask between O and P, one can by inspection classify visibility cases as *visible*, *not*

visible, and *doubtful*. The visibility of the *doubtful* cases must be determined by one of the methods described above. Plate 28 shows a case of a mask approximately one-half the height of the difference of elevations O and P. It shows that only when such a mask is located approximately half way between O and P, would there be any doubt as to the visibility of P.

MAP READING IN THE FIELD

General. The map is the only means available for studying distant or inaccessible terrain. Even when the terrain is accessible, the map is still most valuable as a source of names, and a convenient means by which to find one's way about. The officer should

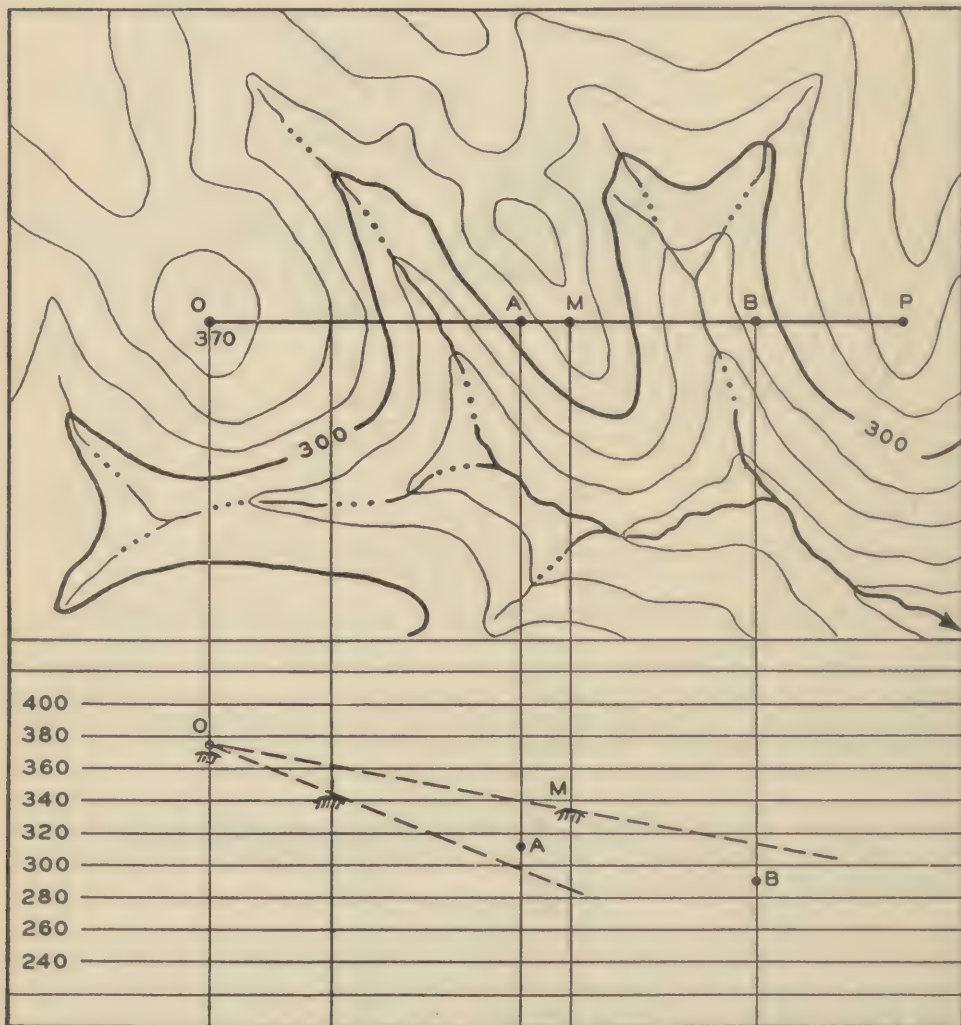
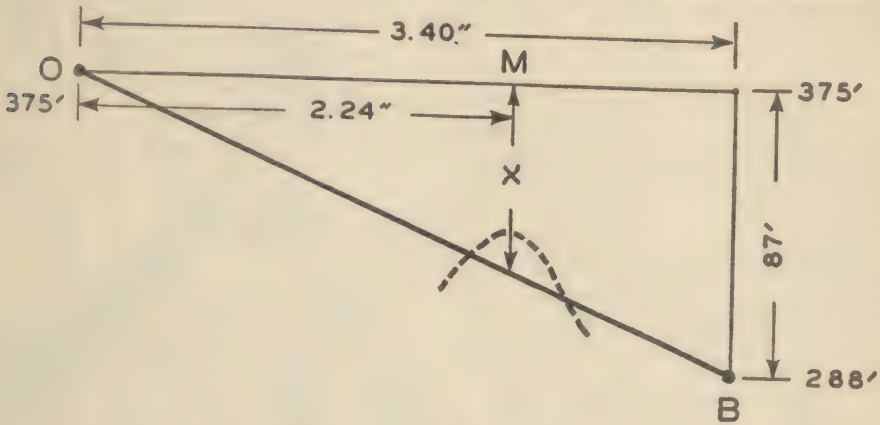


Plate 26. Visibility by Hasty Profile.

always take his map with him into the field, and refer to it constantly. When operating over unfamiliar territory he should keep his movements plotted on his map, verify his location at every opportunity, and from his map learn the names of the terrain features encountered.

Terrain Feature Terms. The standard terrain terms, such as hill, ridge, stream, crest, and the like, are used in map work and in the field. For use in the field to identify more readily the special and the minor terrain features, a large number of less common terms are used. Those most frequently encountered are shown in Plate 29.

Distance. The determination of distance in the field presents many difficulties. Distance can be measured by pacing or by tape, but this method is slow, tedious, and often impracticable. Long road distances can be measured by the odometer of an automobile. Visible areas can be measured by estimation by eye. This requires a certain amount of skill and experience, and is not successful in the dark, in woods, over long distances, or



$$3.40 : 2.24 = 87 : X$$

$$X = 57$$

Plate 27. Visibility by Computation.

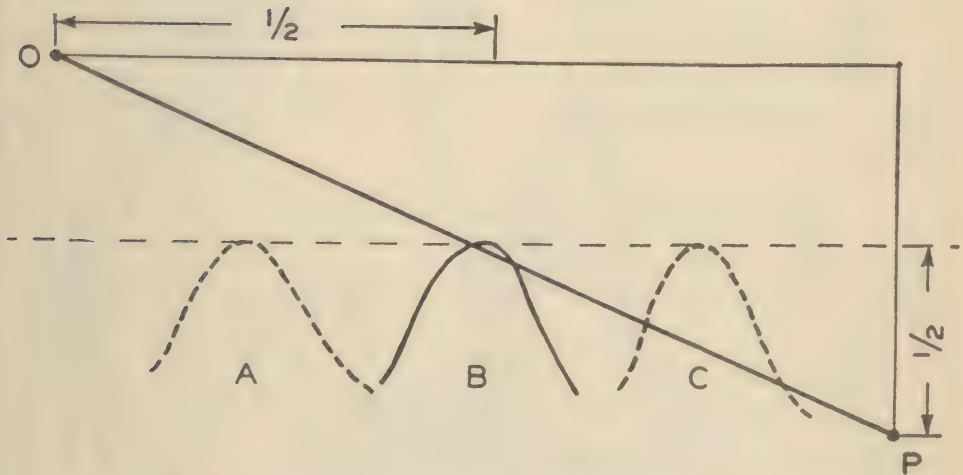


Plate 28. Visibility by Inspection.

in broken country. Two other methods of handling distance in the field are the landmark method, and the travel-time method. For example, a patrol is directed to proceed two miles down a road and take up a position in observation. The patrol leader could take a map, scale off two miles, study the map and select some recognizable feature in that vicinity. He would then march until he reached the feature. On the other hand, if no map were available, he might calculate that the two miles would require forty minutes of marching. He would march forty minutes and then take position.

The Compass. Direction in the field is measured with the compass. There are two types of hand compass issued in the service, known as the *prismatic* compass and the *lensatic* compass. They are shown in Plate 30 and are similar in design, construction, and employment. Each compass consists of a case containing a magnetic dial bal-

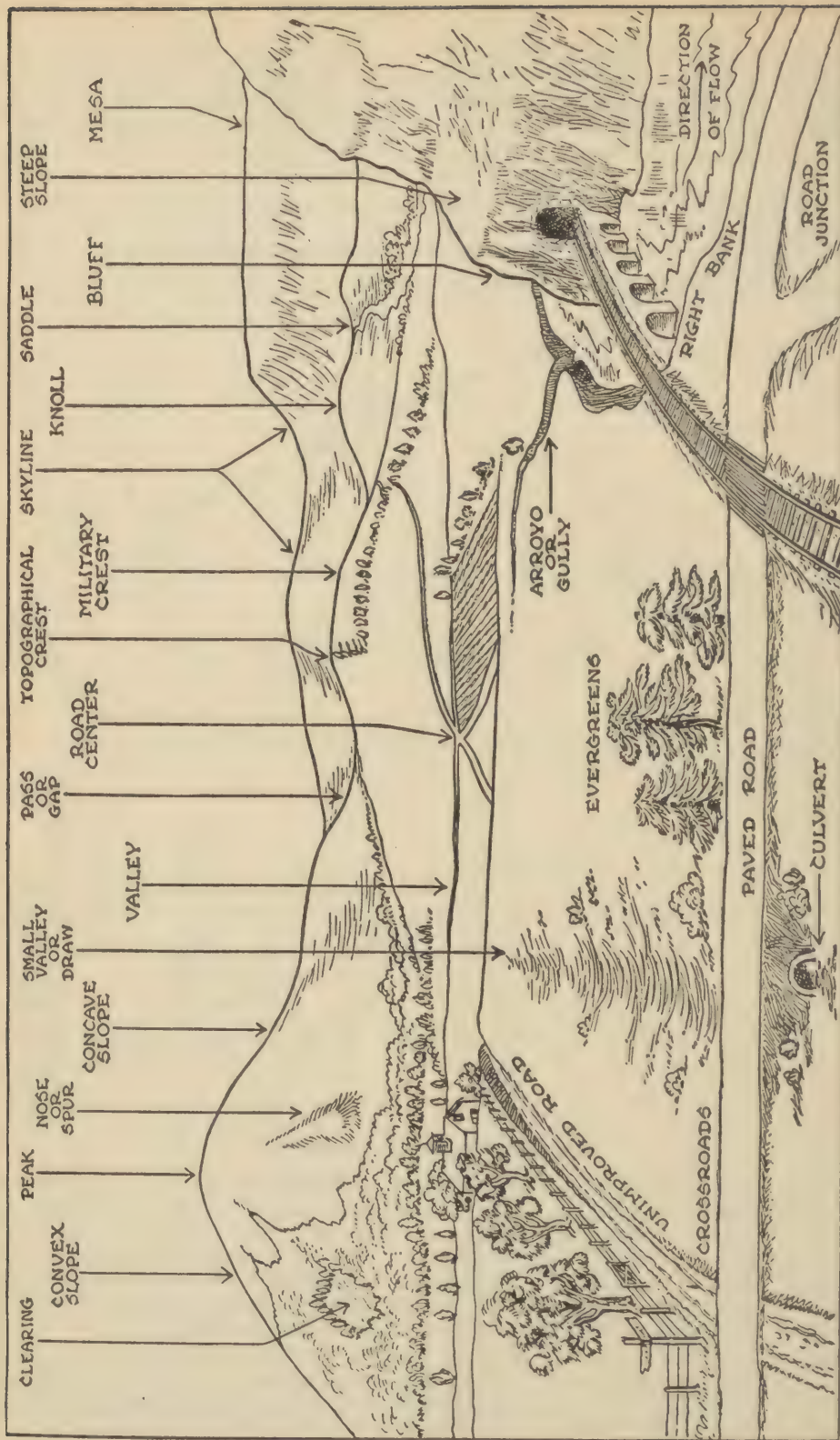
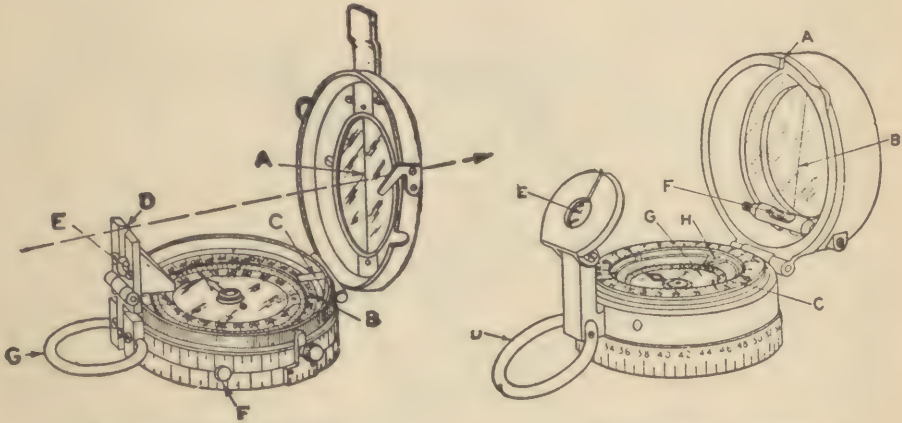


Plate 29. Military Features of the Terrain.

anced on a jeweled pivot, a hinged cover with a glass window, an eye piece containing a prism or a lens for reading the finer graduations of the dial, and a holding ring. The glass cover has an etched line which is used like a front sight, and the eye piece has a slot which can be used as a rear sight. The dial is fixed to a magnetized needle, rotates with the needle, and is graduated for a full azimuth circle. Compasses are provided graduated



The Prismatic Compass

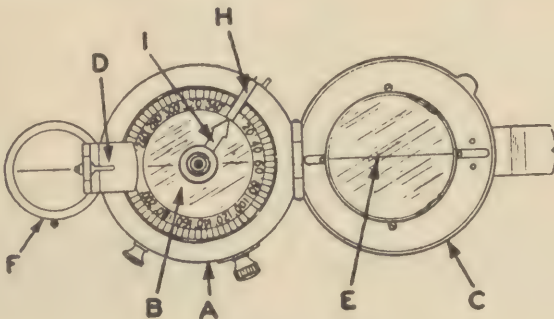
LEGEND.

- A. Front sight.
- B. Index mark on case.
- C. Movable index on crystal (luminous).
- D. Rear sight.
- E. Prism mounting.
- F. Clamp for compass card.
- G. Holding ring.

The Lensatic Compass

- A. Cover.
- B. Front sight.
- C. Index markings on case.
- D. Holding ring.
- E. Lens.
- F. Level.
- G. Compass card or dial.
- H. Xylonite indicator.

Plate 30. Types of Military Compasses.



- A. Case.
- B. Compass card or dial.
- C. Cover.
- D. Rear sight
- E. Front Sight.
- F. Holding ring.
- H. Movable index on crystal (luminous)
- I. Dial needle.

Plate 31. The Prismatic Compass Open.

in degrees, in mils, and in both. There is an index mark inside the body of the compass near the hinge at which point azimuth readings of the dial are made. The cover can be used upright for taking field azimuths, or opened flat for use on the map. The dial is locked by closing the cover, and must be unlocked manually after the cover is opened. The line passing through the slot in the eye piece, the center of the dial, the index mark, and the hair line of the cover is known as the *axis* of the compass. The compass needle



Plate 32. Using the Compass in the Field.

is affected by the presence of iron, steel, or electricity, and will not give accurate readings near an automobile, tank, field piece, machine gun, or power line. A steel helmet, rifle or pistol on the person of the observer may influence the needle and make readings inaccurate.

Measuring Azimuth With the Compass. To read the azimuth of a point on the terrain (distant hill, house, etc.) proceed as follows: Raise the cover and the eyepiece and unlock the dial. Hold the compass to the eye and sight the compass at the object. Hold

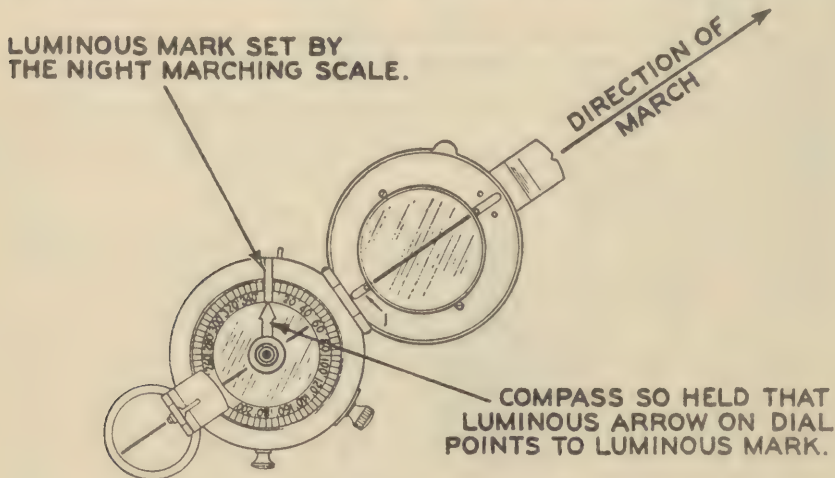


Plate 33. Compass Set for Night Marching.

the compass steady until the dial comes to rest. Read the azimuth figure on the dial at the index point. This will be the magnetic azimuth of the line from the observer to the object. See Plate 32. To establish a given azimuth on the ground, proceed as follows: Raise the cover and lens and unlock the dial. Permit the dial to come to rest. Hold the compass to the eye and watch the dial, facing the entire body about until the desired azimuth figure on the dial is at the index point. Holding the compass in this position,



Plate 34. Orienting the Map by Compass.

look through the *sights* of the compass and pick up some ground feature on the line of sight. The line determined by this feature will be the azimuth desired.

Marching by Compass. *a. By day.* Orders to troops may direct them to attack cross-country in a prescribed direction given in terms of azimuth. Groups or individuals selecting cross-country routes from the map may compute the azimuth of various legs of the trip to prevent the possibility of getting lost. In any such case, map azimuths must be converted to magnetic azimuths before they can be used with the compass. To march by compass, the commander rotates the compass until the dial reads the required azimuth. He then sights along the axis of the compass and selects some hill, house, tree, or other feature on this line. He then marches toward the above feature until he reaches it, or it becomes invisible. He then repeats the operation, selecting a new feature on the line of the required azimuth upon which to guide the march. This is continued until the goal is reached (the compass is not in use while actually marching). The compass is used to select successive features on the required line, and the actual marching is always conducted toward such visible features. The more distant and prominent the feature the easier the procedure.

b. By night. For use in marching at night, the compass is equipped with a movable luminous marker on the top of the case, and with a night-marching azimuth scale on the outside of the case near the base. To set the compass for night marching on a predetermined azimuth, rotate the ring on the top of the case until the luminous mark is at the proper azimuth on the night-marching scale. Hold the compass in the hand with the dial free and turn the entire body until the luminous arrow of the dial points to the luminous marker. The direction of march is now the line of the axis of the compass. Select some features such as a low star, skyline hilltop or saddle, or other recognizable feature on this line and march in the direction of the feature selected. Repeat the operation as often as necessary and make frequent checks of the direction while en route. The setting of the night-marching mark on its correct azimuth must be done before going into the field, or by flashlight screened from enemy ground and aerial observation by an overcoat, shelter-half, or other means.

Orientation in the Field. Whenever the map is studied in the field, it should be oriented to the ground. A map is "oriented" when the directions on the map are parallel to the corresponding directions on the ground. If any one direction on the map can be made parallel to its corresponding ground direction, all other directions will automatically become parallel to their corresponding ground directions also, and the map will be oriented. An individual in the field is said to be "oriented" when he knows his location, both in the field and on the map, and also knows the cardinal directions on the ground.

Orienting the Map in the Field. *a. By compass.* In unfamiliar territory, when the individual is not sure of his location, and when accuracy of orientation is desired, the fastest and best method of orientation is by compass. Place the map on a level surface. Place the compass, opened and with the dial free, upon the map so that the axis of the compass (etched line on the glass cover) is accurately superimposed on and in coincidence with a vertical grid line of the map. The cover of the compass must be toward the top of the map. Revolve the map and compass together until the needle is in the same relation to the grid line as is shown for the magnetic north arrow in the orientation symbol on the map. (See Plate 34.)

b. By inspection. When traveling by road, and when the reader knows his approximate location on the map, the map may be oriented as follows: Lay the map in the road. Rotate the map until the road as shown on the map is pointing down (is parallel to) the road itself. Any trail, stream, ridge, or other line identifiable on both the map and the ground can be used in the same manner.

c. By ground feature. An individual in the field who knows his location, but who may not have a compass available, and who does not know the cardinal ground directions, can orient the map as follows: Study the ground and the map and select some distant feature recognizable both on the map and on the ground. On the map draw a line from the known map position to the above feature. Revolve the map until the line so drawn points toward the feature itself. The map will then be oriented. Sighting is facilitated by laying an alidade, straight edge, or pencil on the line.



Plate 35. Orienting the Map by Inspection.

Locating Oneself on the Map. *a. By inspection.* When an individual knows his approximate location on the map, he studies the visible terrain for distinctive features, and the map to locate and identify these features. He estimates the distance and direction to the features on the ground and notes the corresponding distances and directions on the map. Location by inspection is greatly simplified if the map is oriented to the ground.

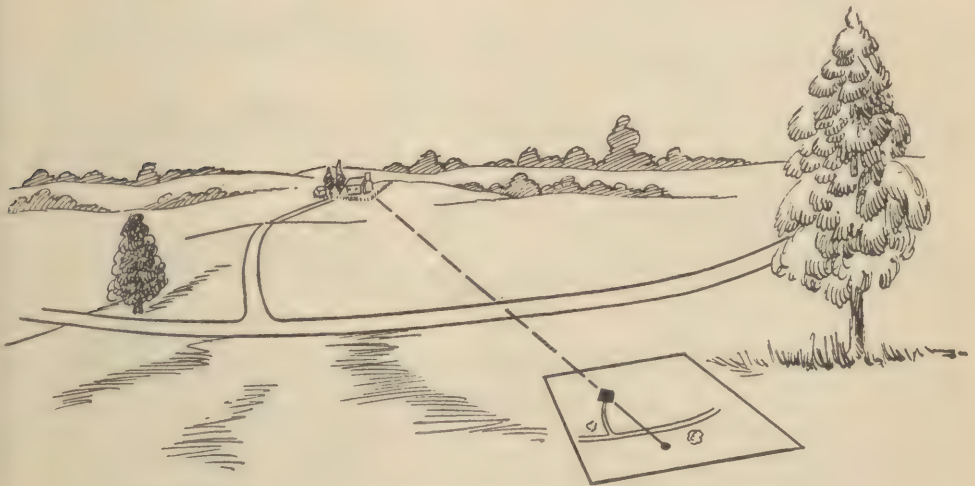


Plate 36. Orienting Map by Ground Feature.

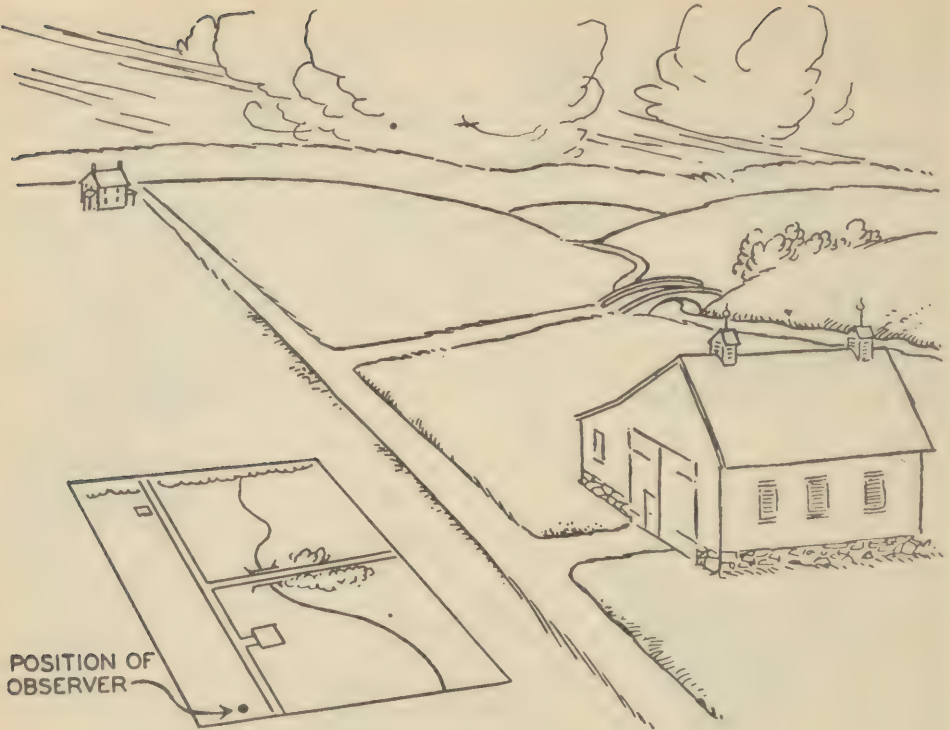


Plate 37. Locating Position on the Map by Inspection.

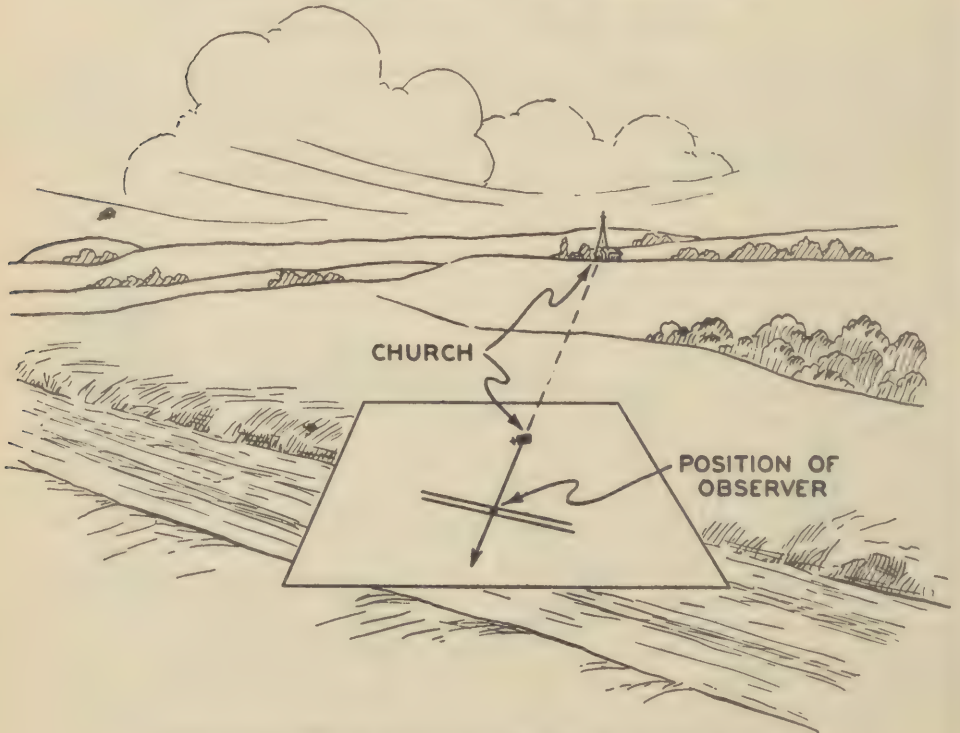


Plate 38. Locating Position on the Map by Single Point.

b. By single point. To locate one's position on the map while traveling a known road, proceed as follows: Orient the map. Select some distant feature of the terrain that can be located and identified on the map. Place a pin through the feature on the map. Take an alidade, pencil, or any straight edge, hold it against the pin and turn it until it points at the feature on the ground. Draw a line on the map along the edge from the pin toward the road. The point where this line intersects the road is the location of the position. Check the results by studying the near-by terrain features and comparing them with the map.

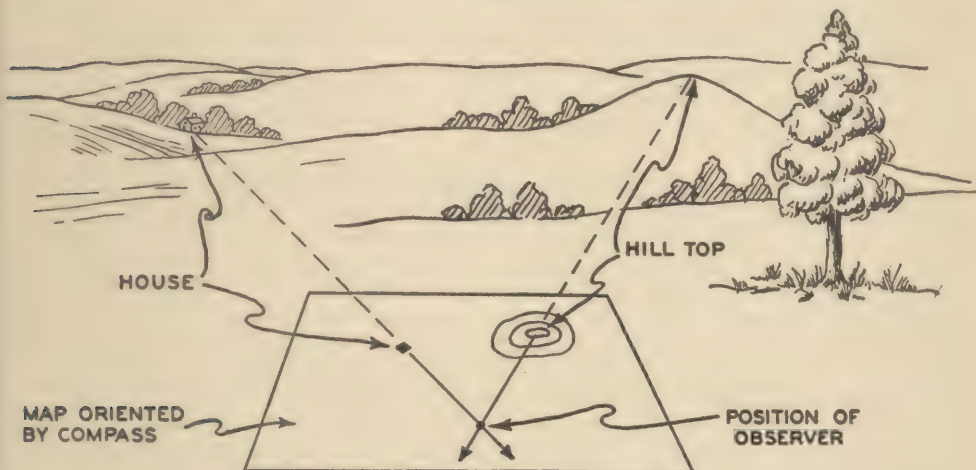


Plate 39. Locating Position on the Map by Resection.

c. By resection. To locate one's position on a map in the field by resection proceed as follows: Orient the map accurately. Select a distant visible feature of the ground, and locate and identify it on the map. Place a pin in the feature, place an alidade or any straight edge against the pin, and turn it until it points at the feature on the ground. Draw a ray on the map from the pin toward your position. Select a second feature, at as nearly a right angle as possible from the first feature. Repeat the operation. The intersection of the two lines is the desired map location. During the entire procedure the map must remain oriented.

Identifying Features in the Field. Features, such as hills and woods, are shown on the map in their horizontal plan. In the field, one sees these features in profile instead of in plan, and their characteristic sizes and shapes may not be apparent. An officer directed to proceed to "SMITH HILL" may see several hills to his front, all of similar appearance, and be in doubt as to which one is "SMITH HILL." Or again, an officer in the field in unfamiliar territory may wish to report some activity noticed in one of several clumps of woods of indefinite and indistinguishable identity. The map is a source of names and therefore of identification. The use of the map for this purpose is one of its most important military uses in the field.

a. To identify on the ground a feature shown on the map. Orient the map. Locate own position on the map and place a pin in this position. Locate the feature on the map and place another pin in its position. Lay a straight-edge against both pins and sight along the straight-edge. The ground feature will lie on this line of sight, and at the distance indicated by the map.

b. To locate or to identify on the map a feature seen on the ground. Single ray method. Orient the map. Locate own position on the map and place a pin in this position. Lay a straight-edge against the pin and sight the straight-edge at the ground feature, keeping the straight-edge in contact with the position pin. Draw a ray (line) on the map on the pin side of the straight-edge. Estimate the ground distance to the feature, and scale this distance off along the ray. This point will be the map location of the feature.

c. To locate on the map a feature seen on the ground. Intersection method. Orient the

map. Locate own position thereon, and place a pin in this position. Lay a straight-edge against the pin and sight the straight-edge at the ground feature. Draw a line on the pin side of the straight-edge. Proceed to some other location from which the feature is visible, and repeat the operation from this point. The intersection of the two lines will be the map location of the feature.

CHAPTER XI

INTERPRETATION OF AERIAL PHOTOGRAPHS

USES OF THE AERIAL PHOTOGRAPH

Introduction. Aerial photographs are very useful military instruments. They were first used extensively during the World War, it being estimated that the American forces alone during the first four days of the Meuse-Argonne offensive produced and used more than 56,000 prints. Since that time there has been improvement in equipment and in technique, and at the present time our air force is well able to perform extensive photographic missions. Commanders in the field may reasonably expect to be provided with ample aerial photographs in the future.

Uses of the Aerial Photograph. a. Intelligence. During a campaign the enemy positions and rear areas are photographed and the photographs carefully studied for indications of his organization, and for possible artillery and bombing targets such as supply points, assembly areas, command posts, and artillery positions. These features may sometimes be recognized directly from the photograph through their appearance. More often their appearance is carefully disguised, and their presence and identity must be deduced from miscellaneous indications such as converging paths, regularity of outline or arrangement, grass worn away or trampled down, muzzle-blast marks, and other similar clues. Important enemy areas are rephotographed from day to day and the latest photograph compared with earlier ones. Trees, bushes, and other detail on today's photograph that may appear entirely natural, may not appear at all on previous photographs of the same area, thereby disclosing their artificial nature. The comparative study of roads may show indications of abnormal traffic during the night, thus giving warning of the location of impending attacks or withdrawals. The study of the aerial photograph for the purpose of deducing enemy information is known as *interpretation*. It is a highly specialized subject requiring special experience and training, and is not the primary interest of the combat officer.

b. Map making. The aerial photograph is very valuable as a basis for the construction of maps. Ground surveying for map making purposes is slow and laborious, and is never possible in the case of territory that lies in the hands of enemy forces. The aerial camera records such features of the terrain as roads, railroads, towns, houses, streams, woods, and cultivated areas, and shows them in their proper size, shape, and relation to each other. From rectified photographs these features may be traced and maps constructed. Machines have been developed (the "multiplex" and the "aerocartograph") which work on the stereoscopic principle and by which contours may be plotted directly from overlapping aerial photographs. This use of the aerial photograph is a specialistic one, and is not the concern of the combat officer.

c. Tactical. Any commander needs detailed and reliable information concerning the terrain over which he must fight. Formerly, this information could only be obtained through personal reconnaissance and from maps. The aerial photograph gives an additional source of information regarding the terrain. Its great value in this respect is obvious in situations where personal reconnaissance is impracticable and when maps are not available. Even when maps are available, it is probable that there will have been many changes since their compilation. Old roads are often abandoned or resited, and new roads constructed, woods are cut down, and fields formerly cultivated are found grown up into brush and woods. Maps show these features as they existed at the time the data was compiled, which may have been years before. An aerial photograph, however, shows the terrain exactly as it is. The photograph is, therefore, a very valuable source of information with reference to the terrain, in that it gives reliable, up-to-the-minute information. It is in this connection that the aerial photograph is of great importance to the tactical officer.

Terms. An aerial photograph taken with the camera pointing straight down is called a *vertical*, and shows the ground in its horizontal plan similar to that shown by a map. A photograph taken with the camera pointing sideways is called an *oblique*, and shows the

ground as a landscape picture. Obliques are usually taken with the camera axis depressed about 30 degrees below the horizontal, though this is not a fixed requirement. Two or more verticals taken in succession at the same altitude and each overlapping the other may be fitted together to form a larger picture called a *mosaic*. If the mosaic follows along a single line, such as a road or a stream, it is called a *strip mosaic*. A 60 percent overlap in successive prints is desired in taking verticals for the purpose of making mosaics. This permits accurate registration, and also facilitates the use of the prints for stereoscopic study. If a mosaic is constructed by matching the details of the adjacent prints by inspection it is known as an *uncontrolled mosaic*. In mosaics of this type a certain amount of error occurs, and this error tends to become cumulative toward the outer edges of the mosaic. To construct an accurate mosaic a ground control based on ground surveys is first plotted, and the individual prints are then registered to this basic control. Such a mosaic is called a *controlled mosaic*, and its error does not exceed that of the individual print. Photographs taken by the multi-lens cameras are called *composites* since they consist of both verticals and obliques. Plate 1 shows a relative plotting of a vertical (1:10,000) and an oblique (5000 feet) for shape and area. Plate 2 shows the characteristic shape of a five-lens composite.

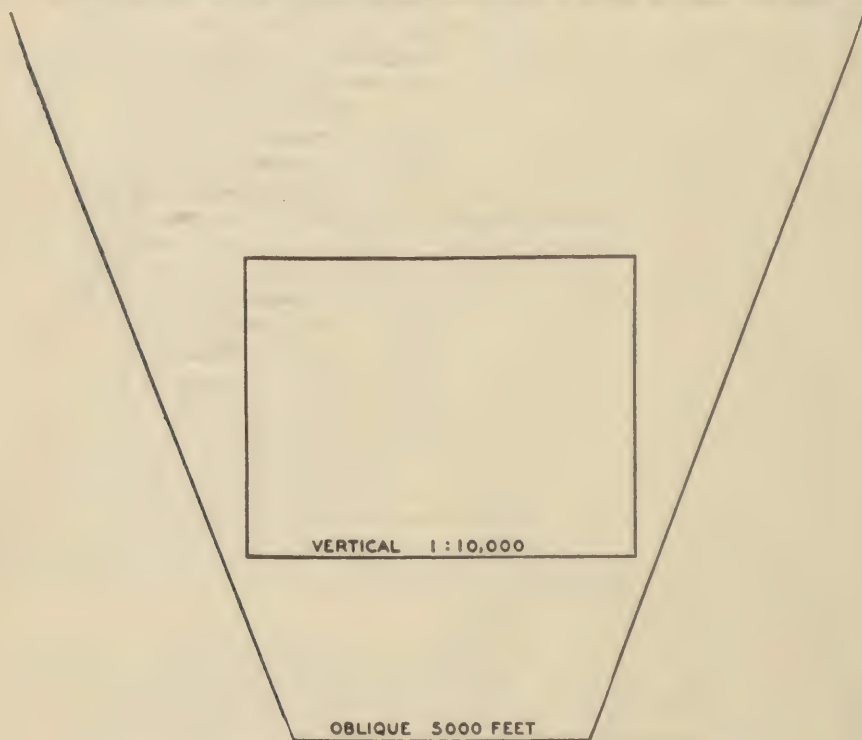


Plate 1. Comparative Plotting of a Vertical and an Oblique.

Sizes. The standard single-lens camera (K-3 type) produces a print 7" x 9". Photographic sections are equipped with laboratory equipment that is capable of producing prints up to 20" x 24" in size. Individual prints may be enlarged to this size when so desired. Also, a mosaic may be rephotographed either as a whole or in sections and reproduced in sheets 20" x 24" in size. The multi-lens cameras take pictures of other sizes. They are used primarily for mapping projects and it is seldom that the line officer will encounter them in their original print form. The amount of ground area shown in any individual print depends on the type of camera used (focal length) and the altitude from which the picture was taken. Plates I, II, and III are vertical photographs of the same area made from different altitudes and over a period of years. (Note. Plates referred to in Roman numerals, numbered serially from I to XII, are *photographic plates* and are to be found in

this section. They should not be confused with the plates with Arabic numbers.) The relative area of ground included in each photograph is shown by the plotting on the map in Plate 15. Study carefully the relation of the altitude upon the recorded area in each case, and also the relation of the altitude upon the amount and clarity of the minor detail recorded.

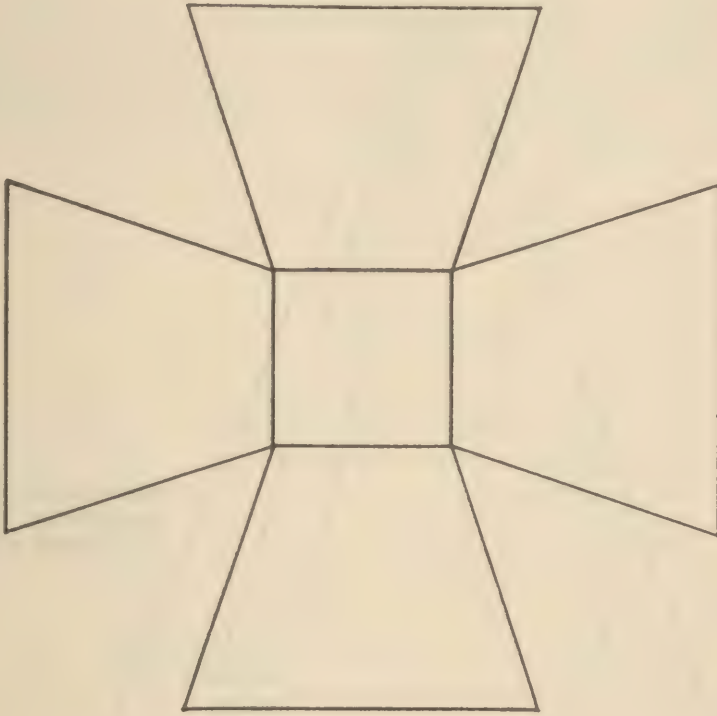


Plate 2. Five-lens Composite (rectified).

Distortion. a. Tilt. A true vertical photograph of a flat surface will show all features thereon in their proper relation as to size, shape, spacing, and direction. Should the axis of the camera be tilted from the perpendicular at the time the picture is taken the result tends toward an oblique. In such circumstances the ground shown at one edge of the photograph is farther from the camera than that at the other edge, and therefore the detail shown registers smaller. Thus, a scale used in connection with one edge of the photograph would not be true for the other edge, and for this reason it is said to have distortion due to tilt. The tilt in the average vertical produced by our air service, however, is so negligible that distortion due to tilt can be disregarded as having no effect upon the tactical use of the photograph. The plotting of Plate I upon the plot map of Plate 15 shows such a distortion, and it is about the maximum distortion likely to be encountered.

b. Relief. Where the ground being photographed is extremely rugged, the higher portions are nearer to the camera and for this reason will be recorded slightly larger than their proper relative size. Also, the tops of any high points will be displaced outward from and the low points displaced inward toward the center of the photograph. Such distortion, however, is practically unmeasurable on average terrain photographed from 10,000 feet or higher, and can be disregarded for our purposes. In photographing average terrain the distortion due either to tilt or to relief will never be sufficient to cause the reader to get an incorrect conception of the nature of the terrain, or of its individual features.

Plate 3 demonstrates the manner in which relief causes distortion. The plate shows an imaginary, huge vertical cylinder toward one side of the area. The camera would

show the top of the cylinder to be relatively larger than its base (because it is closer to the lens), and also would show the top to be displaced outward because of parallax. This illustration contains great exaggeration. The small vertical line toward the left of the diagram is drawn to scale (.034 inches) and represents the relative height of

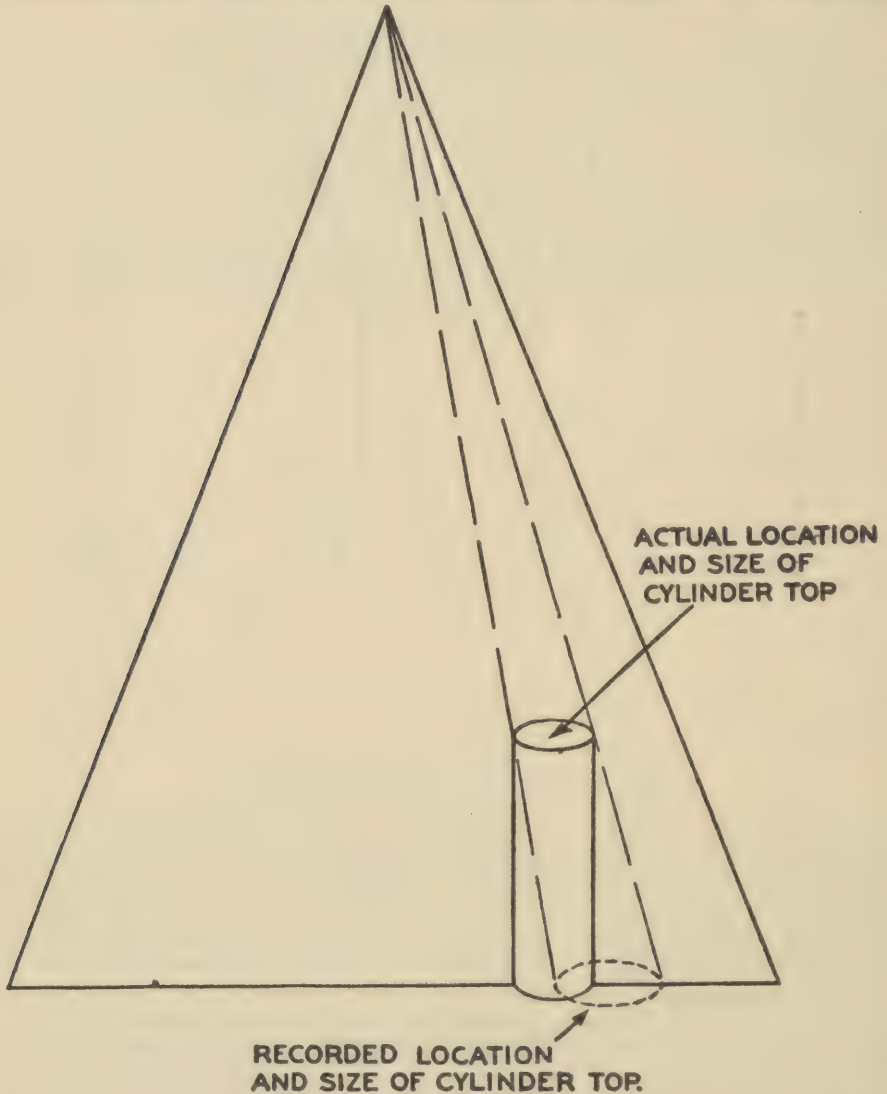


Plate 3. Distortion Due to Relief.

a 100 foot hill on a 1:15,000 vertical. The displacement of the top of this line could scarcely be detected and would approximate the average displacement encountered in verticals of this nature.

THE RECOGNITION OF FEATURES

Orientation. *a. Map.* When the photograph is being used in conjunction with a map the photograph should be oriented to the map. Maps are constructed with the north of the map at the top, and all the lettering and figures are entered on this basis. Photographs, on the other hand, are not necessarily taken on a north-south axis and the original prints do not show any lettering for orientation. Therefore, it may be necessary to study

the photograph from all angles to find some feature by which its location on the map may be determined. Once its general map location has been determined, the photograph should be placed so that its features are oriented to the map features.

b. Shadow orientation. Ground shadows recorded on aerial photographs are of tremendous importance in their effect upon the manner in which the mind of the reader interprets appearance. Plate III has especially fine shadow values that cause the relief of the area to stand out clearly. The finger-type drainage lines in the lower center with their pronounced valleys and separating dome-shaped spurs are very apparent, as are also the two clearcut gully-type drainage lines at the left of the photograph. Face toward the light and invert this photograph so that you are looking at it upside down. From this position the relief will appear to have reversed, the former valleys now appearing as encircling ridges, and the former spur ridge now appearing as an amphitheatre. The gully-type

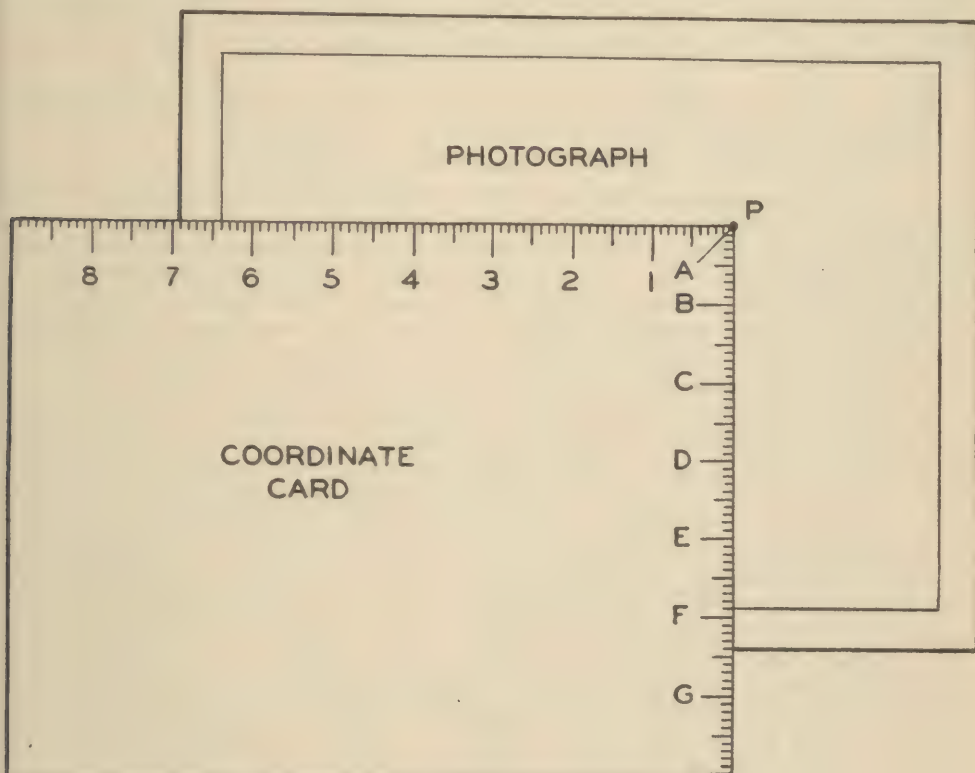


Plate 4. Using the Photo Coordinate Card.
(The coordinates of "P" are (6.4-E.9))

drainage lines, now on the right, will appear *extruded*; and even the woods will have an unnatural pockmarked, crater-like appearance. Nothing has changed in the photograph itself. If there is any change it is in the mind of the reader. It is a form of optical illusion. Nevertheless, it exists, and must be given full consideration. For this reason it is necessary that a photograph be correctly oriented for light when it is being studied for the recognition of minor detail, especially relief detail. It is correctly oriented when the shadows on the photograph fall *toward* the reader. It is best to face toward the source of the light so that the light falling on the face of the photograph coincides with the direction of light as it fell on the ground. The direction of light can be determined from the shadows of buildings, lone trees, or the edges of woods. All the photographs in this text have been oriented for shadow, which, unfortunately, causes them to be upside down with regard to map orientation.

The Photo Coordinate Card. It is difficult to indicate the location of objects on an aerial photograph because of the lack of names and of a grid system. Location is therefore indicated by means of a coordinate card especially designed for use with aerial photographs. The method, in general, of handling the card is the same as that for using the coordinate cards in map reading. The card is divided into inch divisions, and each division is subdivided into tenths. The horizontal divisions are given numbers, and the vertical divisions are identified by letters. This is done in order not to confuse them with map coordinates. The left-to-right reading is always given first, followed by a dash and the bottom-to-top reading. The combined figure is inclosed in parenthesis, as in map coordinates. Plate 4 shows the proper use of a photo coordinate card, the coordinates of point "P" being (6.4-E.9). Aerial photographs reproduced by the lithographic process as *photo-maps* often have a coordinate control in tenths of inches printed around the margin. In the absence of a coordinate card photograph coordinates can be read with any ruler graduated into inches and tenths. Measure the distance across from the left edge, and then the distance up from the bottom, expressing the major divisions of the last measurement in letters.

Legend. A legend giving necessary identification information is placed on the lower edge of photographs beginning at the lower left-hand corner. The following is a typical legend:
(V-43-74OC-16 OBSN) (12-21-36-9:32A) (12-15000)

The legend as shown above indicates that the photograph is a vertical, that its serial number is No. 43, and that it was taken of area 74OC by the 16th Observation Squadron. It also indicates that the picture was taken on the 21st of December, 1936, at 9:32 in the morning, and that it was taken with a camera having a 12-inch focal length lens from an altitude of 15,000 feet. The name of the most important terrain feature, or the map coordinates of the center of the photograph are often added when known. In the case of a series of photographs taken for mosaic purposes this legend may appear on the first and last print of the series, the others showing their serial numbers only.

Recognition of Features. *a. Recognition and identification of features.* The recognition and identification of features on an aerial photograph are easy. One sees familiar things, and sees them as they actually appear. Unlike the map, which resorts to artificial signs or symbols to represent ground features, the photograph literally provides a picture of the feature itself. For this reason, in order to read photographs skillfully and accurately, the reader must be familiar with the appearance and characteristics of original ground features. The photograph, being taken from above, shows features in their horizontal plan only. This is excellent for showing cities, roads, woods, fields, streams, and all the natural ground features. In the case of a feature whose special identifying characteristic is its vertical profile, such as a church steeple, factory chimney, silo, or water tank, its identity may not be apparent directly from the photograph. However, shadows, when present, often outline its profile on the ground and thus disclose its identity. Shadows by their relative lengths often disclose the relative heights of buildings and trees. On the other hand, when the buildings or trees are known or suspected to be of uniform height, the relative lengths of shadows cast indicate the direction and amount of ground slope, if any.

b. The part played by color. The eye is very sensitive to color. Therefore, color plays an important part in our daily recognition of features. The aerial camera on the other hand does not record color, but evaluates the things that come within its focus in terms of their light reflecting properties. Light colored objects usually reflect more light than dark ones and therefore appear *lighter* on photographs. But all colors do not reflect light in the degree that one might expect, and the texture of a surface may have a greater effect upon its light reflecting properties than its color. Shadows reflect almost no light and therefore show up black on photographs and are very prominent for this reason.

c. Roads. Exposed earth reflects light well, and therefore roads, paths, construction work, and cultivated fields appear white on aerial photographs. Improved roads may be recognized by their greater and more uniform width, and their more regular curves. Primary gravel roads usually appear wider and often lighter than paved roads. Railroads are usually darker, and narrower than highways, with long straight tangents and

more gentle and accurately engineered curves. Plates I, VI, VIII, and IX contain various types of roads and the last two contain railroads.

d. Details revealed by the camera. Woods may usually be identified as such by their characteristic tree composition. They usually appear as dark patches, not only because they are of a darker color, but because each branch and leaf is casting shadows on lower or adjacent branches, leaves, or the ground itself. Though the camera may not record the individual shadows, it, nevertheless, is sensitive to the reduced light reflection of the area as a whole caused by the general prevalence of shadows. For this same reason tall grass with its longer shadows appears darker than short grass, even though to the naked eye there is no perceptible difference of color and the shadows themselves may escape notice. The camera is so sensitive to light that it records the difference in the amount of light falling on reverse slopes as compared to forward slopes, even though the sun is shining directly on both. This is the case with the finger-type drainage area noted on Plate III. A realization that the camera records all detail in terms of light reflecting properties greatly facilitates understanding aerial photographs. Plate VII, center, contains patches of thick woods, thin woods, scattered trees, grass land, and areas partly devoid of grass due to surface erosion. Plates X and XI also show various types of woods. In Plate VII, bottom, there appear some dark areas that are not woods but are the shadows of small clouds.

e. Water is revealed by the camera. Clear water does not reflect light and therefore shows dark on photographs (Plate VII, center), but if the water is muddy the dirt particles in suspension tend to reflect light, and the water will appear grey and at times quite light. The trace of streams that cannot be directly seen may be identified by their characteristic pattern and by the more luxuriant vegetation along their courses. Plate VII, top, shows a winding stream with sandbars at the bends. It also shows a primary highway and bridge. Plate X shows a characteristic drainage pattern. Plate XI shows minor drainage of various types. In the upper left are minor drainage lines through cultivated ground; in the left center one can see a small stream bed passing through grass land, probably a pasture; in the right center are wooded stream lines passing through a lightly wooded area; at the upper right are artificial drainage ditches in a cultivated stream bottom. Incidentally, the upper left corner of this particular photograph shows with unusual clarity the terracing of cultivated slopes. Such terraces are to prevent soil loss through erosion, and they run at right angles to the direction of slope. Thus they have the characteristics of contours, and as such clearly indicate ground forms.

f. Minor details. The identification of minor detail depends primarily upon personal familiarity with the characteristics of the original features. On Plate IV the military reader would easily identify as such the trench system in the center of the plate. He would also quickly recognize the four light spots at (0.75-B.60) to be an artillery firing position, because of the arrangement of the spots. The guns themselves cannot be detected but the four white spots are peculiar to bare earth exposed by the muzzle-blast of field pieces. Likewise, the dark objects at (2.6-A.3) are characteristic of motor vehicles halted off the road.

A good reading glass brings out a wealth of detail and is a great aid in studying photographs.

SCALES AND AZIMUTH

Scales. The aerial photograph shows the features of the ground such as the roads, streams, woods, fields, and villages in their relative sizes, distances and directions one to the other. In this respect the photograph may be considered as a map and all the data regarding size, distance, and direction obtainable from maps can be secured from the aerial photograph by applying the methods and procedure normal to map reading. However, the photograph as at present issued to the using services frequently does not show scale and orientation data. It is, therefore, necessary for the user to determine these basic data for himself before the photograph can be used conveniently, or to the full extent of its capabilities. Scales are usually expressed as a representative fraction. A representative fraction is the mathematical relation of a unit of map (photograph) measurement to the corresponding ground measurement, expressed as a ratio of similar units.

Determining Scale. *a. By focal length and altitude.* The triangle formed by the negative

and the lens within the camera is similar to the triangle formed by the lens and ground area included in the exposure. Since these are similar triangles the relation of the two bases (the size of the photograph as compared with the ground area) will be the same as the relation existing between the bases of any two similar triangles. (See Plate 5.) The third group of data shown in the legend usually appearing on individual prints gives the focal length in inches of the camera used and the altitude in feet at which the picture was taken. Therefore, the ratio established by these figures is the same ratio as that of the photograph to the ground, or of any portion of the photograph to the corresponding portion of ground. Accordingly, it constitutes a photo-to-ground ratio and needs only to be reduced to common units, and to unity, to be the representative fraction of the photograph.

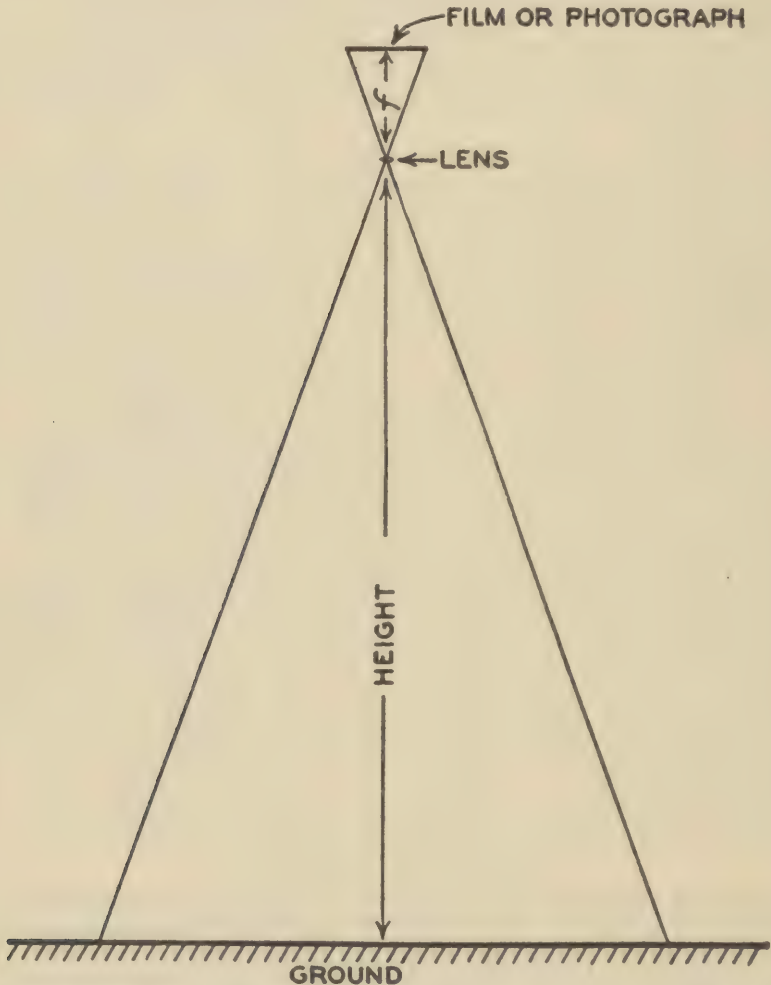


Plate 5. The Scale (RF) of a Photograph is the Ratio of the Focal Length to the Height.

In the case of a photograph showing the legend data, "(12—15,000)," its representative fraction is determined as follows:

$$\begin{array}{rcl}
 & \text{"(12—15,000)"} & \\
 12 \text{ inches} & : & 15,000 \text{ feet} \\
 1 \text{ foot} & : & 15,000 \text{ feet} \\
 1 & : & 15,000 \text{ (RF)}
 \end{array}$$

The two cameras most frequently used have focal lengths of 12 inches and 8.25 inches respectively. The representative fraction of a photograph taken with the latter camera, and showing the following data, "(8.25—13,000)" would be determined as follows:

$$\begin{aligned} 8.25 \text{ inches} &: 13,000 \text{ feet} \\ 8.25 \text{ inches} &: 156,000 \text{ inches} \\ 1 \text{ inch} &: 18,909 \\ 1 &: 18,900 \text{ (approximate RF)} \end{aligned}$$

With cameras of any other focal length the representative fraction is determined in a similar manner, using the focal length and height data given in the legend.

The scales determined by the method shown above are only approximately correct. The altitude as set forth on the photograph is often the altitude of the plane above sea level. Should the mean ground level be considerably higher than sea level the height of the plane above the ground should be determined and used in the calculations. The height of the plane is its altitude above sea level minus the mean elevation of the ground area.

b. From the map. When a map of the area is available the scale of the photograph can be easily determined. It is ascertained by finding the ratio existing between the length of any line on the photograph and the corresponding distance on the ground. The photo distance is measured on the photograph with a ruler. The ground distance is determined by normal map reading methods. For example, we wish to determine the scale (RF) of Plate II, using the map in Plate 15 for data. The line from the CR at BM 346 (16.2-19.3) to the nearest water tank on EBBERT HILL (18.8-19.7) is selected for the datum line. This line measured on the map by means of its graphic scale is found to be 2660 yards or 95,760 inches of ground distance. The same line located and measured on the photograph measures 6.70 inches. We find that 6.70 inches on the photograph equals 95,760 inches on the ground. Therefore, 1 inch on the photograph equals 14,293 inches on the ground and the scale (RF) of the photograph is 1:14,300.

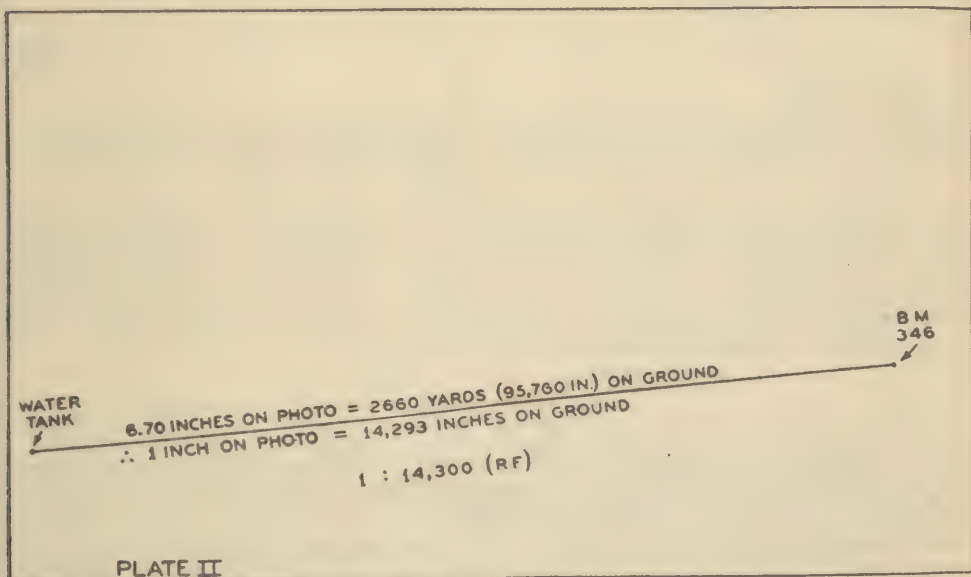


Plate 6. Determining the Scale (RF) of a Vertical Photograph by Means of a Ground Distance Secured from a Map.

Datum lines selected for the purpose of making scale computations should be as long as possible, and preferably should pass through the center of the photograph rather than along an edge. When accurate results are desired two or more different lines should be used and computed, and the average of the separate computations determined.

c. From the ground. The scale (RF) of an aerial photograph can be determined from the ground itself whenever a map is not available. The scale of the photograph shown in Plate I would be determined in the following manner. The main road from the crossroads at (7.20-A.53) to a point at (1.31-A.28) where the small curved trail joins the road is selected for the datum line. Measured on the ground by means of an automobile odometer, it is found to be 2.61 miles. The same distance measured *along the road* on the photograph in inches is found to be 7.34 inches. Therefore, 7.34 inches on the photograph equals 2.61 miles, or 165,369.6 inches, on the ground with the result that 1 inch on the photograph equals 22,530 inches on the ground. The scale (RF) of the photograph would therefore be expressed 1:22,500. The ground measurement could have been determined by pacing, by using a tape, or by any other means.

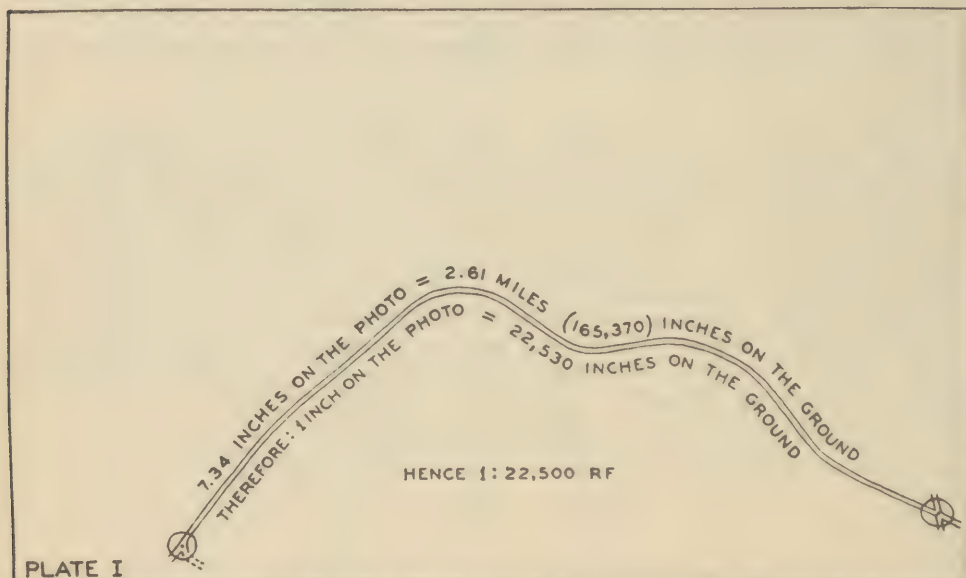


Plate 7. Determining the Scale (RF) of a Vertical Photograph. The Ground Distance Was Determined by Measurement on the Ground.

d. Making a reading scale. A scale expressed in representative fraction form is of little value in making measurements of distance. For the purpose a graphical reading scale is more serviceable and should be constructed. A reading scale of 1000 yard units is the most convenient. The scale of the photograph in Plate II was determined (in *b* above) to be 1:14,300. This means that one inch on the photograph equals 14,300 inches on the ground. One thousand yards is 36,000 inches.

$$\begin{aligned} 1:14,300 &= x : 36,000 \\ 14,300 x &= 36,000 \\ x &= 2.52 \end{aligned}$$

A line is drawn on the margin of the photograph and divided into 2.52-inch divisions, each of which represents 1000 yards of ground distance. The left division is then subdivided into tenths to represent 100-yard distances.

A photograph coordinate card, divided into inches and tenths of inches, provides a convenient reading scale based on inch units. In the case of plate II whose scale (RF) was determined above to be 1:14,300, this would be done as follows:

$$\begin{aligned} 1 &: 14,300 \\ 1 \text{ inch} &= 14,300 \text{ inches} \\ 1 \text{ inch} &= 399\frac{1}{2} \text{ or } 400 \text{ yards} \end{aligned}$$

The above having been determined, the coordinate card may be used both for location and also for distance measurements.

Direction and Azimuth. *a. Orientation.* An aerial photograph, unlike a map, is not automatically reproduced on a north-south axis. It is convenient to know the correct orientation of the photograph when using one and this knowledge is necessary when azimuths are to be secured from it for marching or fire control purposes.

An approximate north orientation can be made based on the shadows, when the date and time of day at which the picture was taken are known. An accurate orientation can be made when a map or the ground itself is available. Since the photograph is usually used in conjunction with the ground itself, it is preferable to determine the *magnetic*, rather than the true or the grid orientation, and to use *magnetic azimuths* for all computations.

b. Determining a base azimuth. When a map is available a line is selected that can be accurately located on both the map and the photograph. The grid azimuth of the line is measured on the map and converted to magnetic azimuth. This will be the magnetic azimuth of the same line on the photograph. The protractor is placed on the line on the photograph so that it reads the proper azimuth. A line drawn along the base of the protractor will be the magnetic north or zero line for orientation. For example, in Plate 15 the line from the CR at BM 346 (16.2-19.3) to the nearest water tank on EBBERT HILL (18.8-19.7) has a grid azimuth of $81\frac{1}{2}$ degrees as read from the map with a protractor. Based on the orientation symbol of the map this is a magnetic azimuth of 81 degrees (to the nearest half degree). The same line is drawn on the photograph and the protractor placed thereon, reading 81 degrees. (See Plate 8). The magnetic north will be the line of the base of the protractor, and is so drawn and labeled. It may be plotted at any desired point along the datum line. In the absence of a map, two inter-visible features are selected

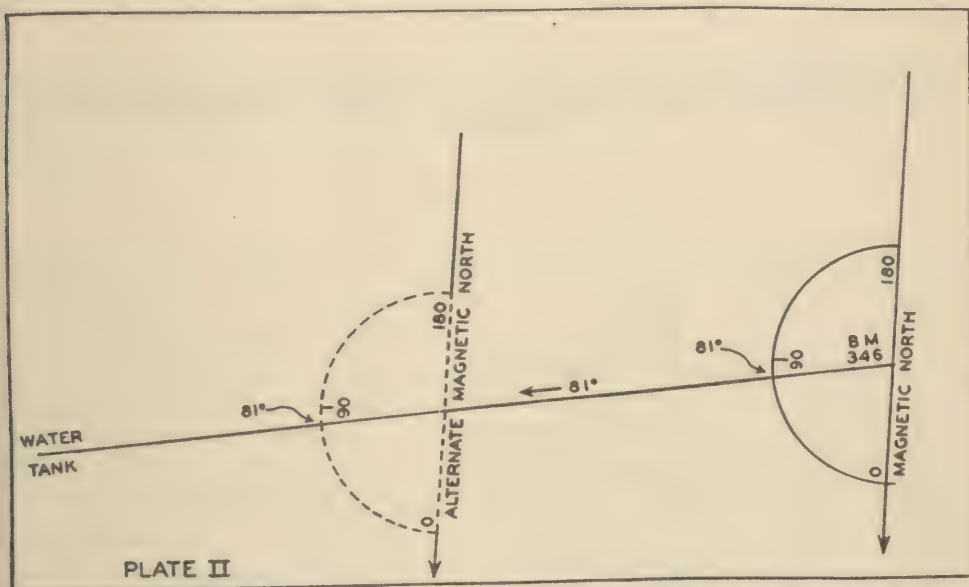


Plate 8. Determining Magnetic North. (Diagram Oriented to the Photograph.)

on the ground that can also be identified accurately on the photograph. The magnetic azimuth of the line thus determined is read on the ground with a compass. The north line of the photograph can then be determined from this data in the same manner as described above.

c. Making azimuth measurements. Once a zero azimuth line has been determined and plotted, the azimuth of any line can be measured by normal map reading methods. Prolong the line whose azimuth is to be determined until it intersects the zero azimuth line, and read the azimuth directly with the protractor. If the zero azimuth line is inconveniently located, another can be plotted at any location desired, either by drawing it parallel to the original line, or by re-basing it on the datum line. It is not necessary that there be a zero line in order to make azimuth readings. Whenever a line intersects another

line the azimuth of which is already known, the protractor can be correctly oriented by placing it with its proper reading on the known line and then reading the azimuth of the unknown line directly from the protractor scale.

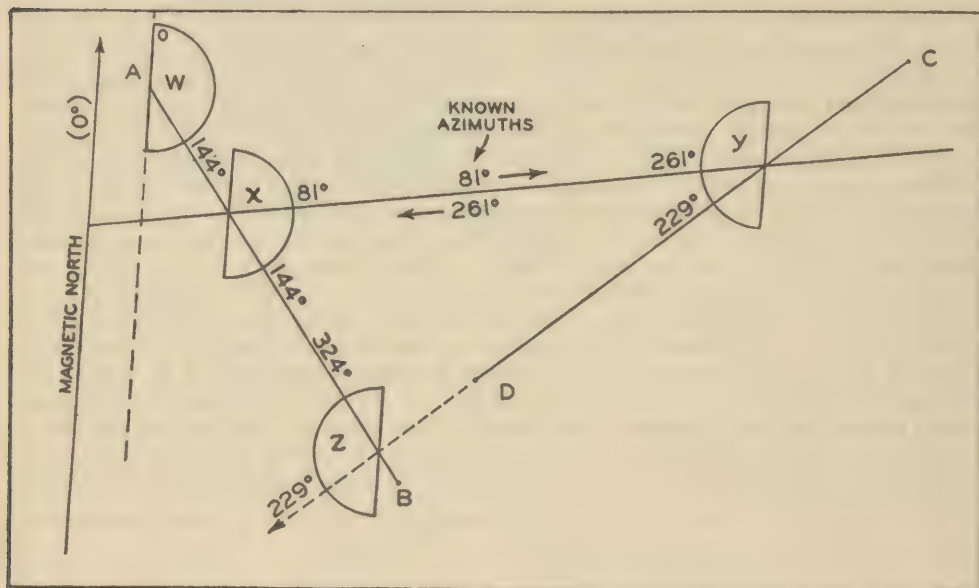


Plate 9. Measuring Photo Azimuths. (Diagram Inverted to Approximate North Orientation.)

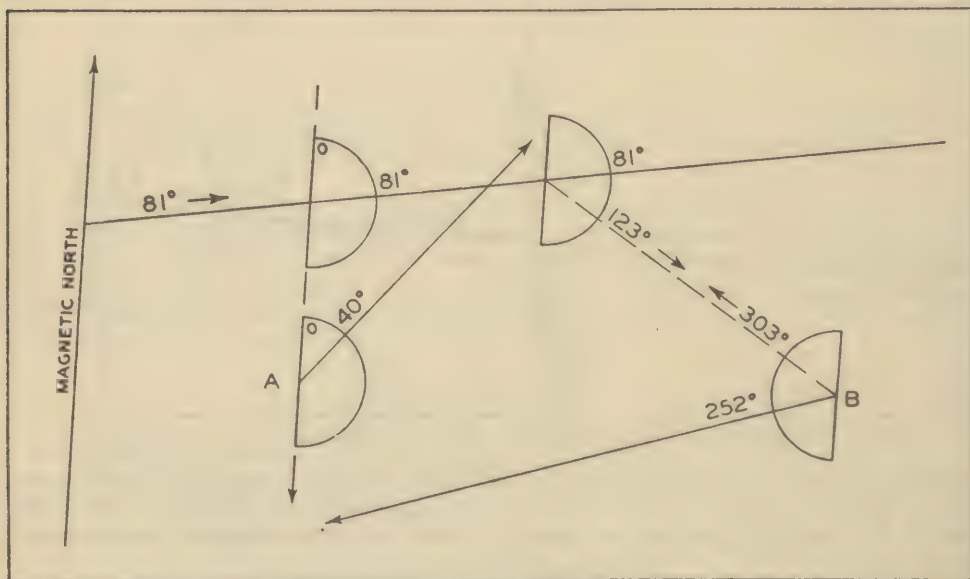


Plate 10. Plotting Photo Azimuths.

d. Methods illustrated. Plate 9 demonstrates various methods of making azimuth readings. A datum line of 81 degrees azimuth (and therefore 261 degrees back azimuth) has been determined and plotted, and a north line plotted therefrom.

(1) *w.* The azimuth of the line A-B is 144 degrees determined by constructing a new north line through A and orientating the zero of the protractor thereon.

(2) x. The azimuth of the A-B is 144 degrees determined at the intersection of A-B with the datum line. The protractor is orientated by placing its 81-degree mark on the datum line.

(3) y. The azimuth of the line C-D is 229 degrees determined at the intersection of C-D with the datum line. The protractor is oriented by placing its 261-degree mark on the datum line.

(4) z. The azimuth of the line C-D is 229 degrees determined by extending it until it intersects line A-B, whose azimuth has previously been determined to be 144 degrees, hence back azimuth of 324 degrees. The protractor is oriented by placing its 324 degree mark on the line B-A.

c. Plotting azimuths. In order to plot an azimuth it is necessary to have for a base a line of known azimuth at the point from which the new azimuth is to originate. A north (zero) line can be erected through the point by orienting the protractor to a known datum line and sliding it along the line until its base line, extended if necessary, passes through the point. Or, a line can be drawn into the point and its azimuth determined as in *c* and *d* above. The azimuth or the back azimuth of this line will then serve for orienting the protractor.

Plate 10 demonstrates various methods of plotting photo azimuths. A datum line of 81 degrees azimuth and a north line based thereon has been determined and plotted.

(1) An azimuth of 40 degrees is to be plotted from A. A zero base line is constructed through A by sliding the protractor along the datum line with a reading of 81 degrees until its base line passes through A. The protractor is then moved to and oriented at A and an azimuth of 40 degrees is plotted.

(2) An azimuth of 252 degrees is to be plotted from B. A line is drawn from any convenient point on the datum line to B, and the azimuth (123 degrees) and back azimuth (303 degrees) of this line determined by methods previously covered. The protractor is moved to B and oriented by placing its 303-degree mark on this line, and the desired azimuth of 252 degrees is then plotted.

MILITARY TERRAIN FEATURES AND STEREOSCOPIC RELIEF

Military Terrain Features. *a. General.* A successful commander is the one who most skillfully utilizes the favorable features of the terrain, and who also knows the unfavorable features so that he can make proper plans to avoid them or to minimize their effect. In general, the most important military features of the terrain are the road net, the wooded and open areas, and the basic tactical relief. A good military map shows all these features. However, with regard to the first two, they are constantly changing. Old roads are improved or abandoned, and new roads put in. Woods are cut down for lumbering purposes or converted into cultivated land. Land formerly cultivated is often abandoned and soon grows up into brush and woods. A good map shows these features as they were at the time of the compilation of the map, but many important changes may have occurred since its compilation. Fortunately, these two types of features, roads and woods, are clearly and unmistakably shown on aerial photographs, being the most easily read features on them. Therefore, in the items in which the map is least trustworthy, the photograph is especially clear. The photograph does not show relief quite as clearly or in such detail as does a topographic map. However, the relief of an area is not subject to pronounced change over a period of years. Accordingly, in the one item in which the photograph is weak the map can still be depended upon. The map and the photograph, used in conjunction with each other provide a most reliable means of studying the terrain. The map furnishes names and relief data, while the photograph provides up-to-the-minute data on existing roads, woods and open areas.

b. Roads are very prominent on aerial photographs, and the details of the road net are quite apparent. From a military point of view more must be known about roads than their location and pattern. Information concerning the nature of the road itself is desirable. Improved roads are generally wider than unimproved roads, and their curves are more regular and gentle. Main improved gravel roads are usually wider than paved roads. Oiled or tarvia type roads show darker than those made of concrete or gravel. Old con-

crete roads are darker than dirt or gravel roads because of the oil drip from the motor traffic, and in low photographs the double oil drip streaks of the two traffic lanes can often be detected. Unimproved roads are narrow and irregular in width and follow a much more erratic course than improved roads. This is due to the necessity of avoiding steep grades in their construction. They often follow slopes in an angular fashion and pass around hills, spurs, and draws.

Plate IX shows several highways and a railroad converging toward a city. The roads at the lower left and lower center of the plate are obviously old roads as they show many houses along their route. The road across the center is a wider road and for this reason probably a main highway. It is very recent because as yet it has practically no houses along its course. From its general trace it appears that it must be a re-routing of the older road. The road across the top is also wide, probably a main primary road, and from its numerous houses is not a new road. Plate VIII also shows several roads, both primary and secondary, and also the darker course of a railroad. The unusually wide road at the top center with its "fuzzy" edges suggests that the cuts and fills, the borrow pits and waste piles, and perhaps the ditches along the side are still bare earth and not yet grown over with grass or weeds. It is probably a very recently completed improved dirt or gravel road, and in fact, may still be under construction. Incidentally, it is in a valley following along a stream line while all other roads in this area seem to follow the tops of ridges. On Plate I at (2.35-A.55) the "needle eye" formation is characteristic of a place in a road so poorly constructed that, on occasions, traffic must detour, thus forming by-passes. Such detail is invaluable in disclosing the nature of roads. From this one item one can deduce that this road may at times be very bad, and that it should be reconnoitered before being used. Such information can never be secured from maps.

c. Woods are important military features. Woods in front of positions obstruct fields of fire of the defense, and offer covered avenues of approach for the attack. Woods in the rear areas afford concealment for reserves, supply points, command posts, train parks, and similar installations. Therefore, the location and the extent of the wooded area is essential military information. It is also desirable to know the nature of the woods. Woods consisting of mature trees so closely spaced that the branches interlock (Plate III, right center) have vastly different military value from woods whose trees are so spaced that much of the ground is clearly visible (Plate III, lower right and lower left center). Maps do not generally show this distinction, but it is clearly evident on aerial photographs.

d. *Relief.* Relief is not as easily read from aerial photographs as from topographical maps. Nevertheless, aerial photographs contain much information regarding the basic relief of an area. Good shadow values often picture the relief of the area directly, as is the case with the finger drainage on Plate III, and also in portions of Plate IV. Also, the relative lengths of shadows of buildings and trees of similar height often disclose the direction and the amount of slopes. Terracing, when present, is a clue to relatively rugged country, and can often be seen in photographs as in Plates VIII, IX, and XI. To all intents and purposes they can be considered as form contours and serve as such for indicating relief. Bends in the routes of unimproved roads where they pass around ridges, spurs, and draws, are likewise valuable clues to relief. The most valuable source of information regarding relief, however, is the drainage net, which can be clearly followed on photographs. Relief, that is, the valleys and the ridges, is the result of water erosion. The streams carve out the valleys, and every stream line discloses the location and the direction of a valley. Between any two adjacent streams there must be a ridge line, and its location and direction must conform to the two streams between which it lies.

Streams, or drainage lines, follow definite natural laws and for this reason have easily recognizable conventional patterns. Plate X shows a typical drainage pattern. Plate XI shows various types of minor drainage and their characteristic patterns in various types of background terrain. In both cases the patterns of the drainage lines are clearly marked by the more luxuriant vegetation along their courses. They can be traced out on the photograph, or on an overlay, and will furnish the pattern of the low ground of an area. By placing a form ridge between each two adjacent stream lines, its location approximately centered, and its direction conforming to the stream lines, one will have a pattern of the

ridge framework. Such a framework will not perhaps be exactly true to the ground in all details, but the picture it presents of the general location, direction, and extent of the ridges with their lateral spacing will be a reliable picture of the basic terrain structure of the area. The location, direction, size, and extent of the terrain corridors and cross-compartments thus disclosed can be relied upon for planning tactical operations.

On Plate VIII it is easy to see that the drainage lines all run away from the village. From this it is evident that the village is situated on high ground. Further study of the stream lines shows the village to be on a ridge, and that the main transverse highways and railroad follow along this ridge. The tactical significance of such information is valuable. The higher buildings of this village should offer good observation points and overlook much of the surrounding territory. Also, the roads, being on a ridge, can probably be seen from quite a distance, and troop movements thereon by daylight could be observed by the enemy. Plate 11 shows a tracing of the drainage system of Plate XI. Plate 12 shows the ridge lines added, based on the drainage system. The combined plotting discloses the basic terrain structure of the area. It does not show the details of the minor relief nor the relative heights of the ridges and hills. This data, if needed, can be determined through stereoscopic study.



Plate 11. Basic Terrain Structure
(Drainage lines traced from the photograph.)

Stereoscopic Relief. When a person looks at an object or a landscape both eyes do not register identical images. Because of the lateral spacing between the eyes each eye sees each object from a slightly different angle. The mind takes these two sight impressions and combines them and produces from them a single picture which contains the perception of depth or of the third dimension. This is possible only because of the two separate and slightly different views presented.

In photographing an area for the purpose of constructing a mosaic, the pictures are taken so that there will be considerable overlap. This insures that there will be no gaps, and assists in fitting the pictures together. An overlap of about 60 percent in adjacent pictures is standard procedure. Therefore, on any two adjacent pictures there will be a large part of the area common to both pictures. Moreover, since the plane will have flown some distance between the exposures, the second picture will be from a different position and therefore a different angle from the first. Each picture is considered to be the view that each of the eyes of a person would register if the eyes were at the altitude of the plane,

and the spacing of the eyes were the many hundreds of yards of horizontal distance between the two exposure points. By causing one eye to see one of these pictures only and the other eye to see the other picture only, the result will be similar to that experienced in normal vision, and will permit a perception of depth, thereby disclosing relief.

This is done by the aid of an instrument known as the *stereoscope*. By means of mirrors, prisms, or lenses, it directs the sight of one eye to one picture, and of the other eye to the other picture, and the result gives clear perception of the relief of that portion of the area common to the two pictures. In fact, due to the great distance between the points from which the successive pictures were taken, the relief disclosed by the stereoscope is usually quite exaggerated, and one must evaluate it accordingly.



Plate 12. Basic Terrain Structure.

Ridge lines added by inspection based on the drainage traced in Plate 11.

The stereoscope itself is not necessary for stereoscopic vision. It is only a convenience. Stereoscopic effect is obtained when one eye sees one picture only, and the other eye sees the other picture. Plate XII shows a *stereoscopic* pair, or pictures of the same area cut from the overlap portion of successive prints, and arranged and spaced for use without instruments. Place the plate on the desk about 14 to 18 inches from the eyes. Hold a piece of cardboard vertically between the two pictures so that each eye can see only its respective picture. Permit the eyes to relax somewhat, do not concentrate or stare. Continue to look at the pictures and the stereoscopic effect will develop. Some persons may have to try several times before they get the knack, but nearly everyone attains it with practice.

The same effect can be attained with no aids whatever. Focus the eyes on some distant point, 20 feet or more away, and relax them (day-dream). Move the plate into the line of vision without permitting the eyes to look directly at it or to focus upon it. Rather, look through the plate in a dreamy manner. After several tries the stereoscopic effect should develop.

Summary. A reasonable knowledge and proficiency in *Aerial Photograph Reading*, to meet the needs of the tactical officer, involve the following:

- a. A knowledge of the various types of aerial photographs, and the ability to classify any individual print.
- b. A basic conception of the effect of altitude upon detail registration and amount of area.
- c. An understanding of the data furnished in a legend.
- d. An understanding of the use of the photo coordinate card.

- e.* The recognition and the correct evaluation of roads and road nets.
- f.* The recognition and the correct evaluation of various forms of vegetation in so far as they may afford cover and concealment, or affect fields of fire.
- g.* The ability to plot the outline of a photograph onto a map by inspection, that is, the recognition of terrain detail along the edges.

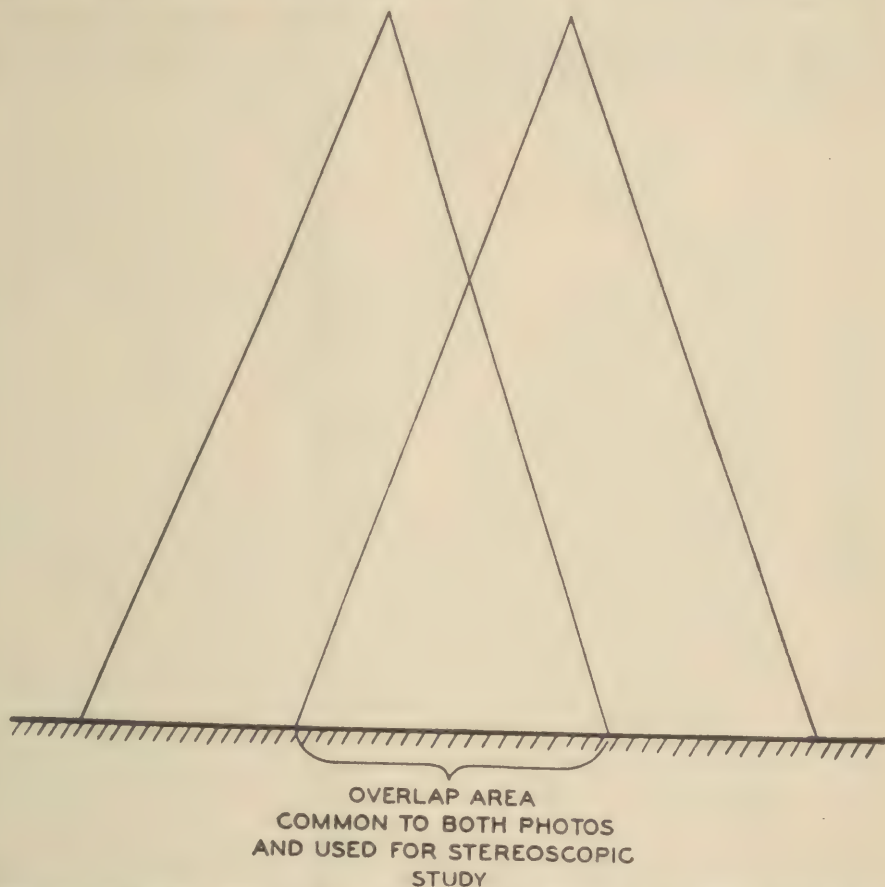


Plate 13. Successive Prints of a Mosaic, Showing Overlap Area Which can be Used For Stereoscopic Study.

- h.* The ability to compute the scale (RF) of a photograph by any of the following means:
 - (1) Focal-length and altitude.
 - (2) Ground data secured from the map.
 - (3) Ground data secured from the ground.
- i.* The ability to construct a graphic reading scale.
- j.* The ability to secure azimuth orientation data and to perform azimuth computations.
- k.* The ability to trace out the drainage system, and to form therefrom a reliable concept of the basic terrain structure.
- l.* The ability to compare the photograph and the map as to essential military features, and to detect any such data appearing on one that is not substantiated by the other.
- m.* The knowledge of the operation, capabilities, and limitations of the stereoscope.

A direct comparison of a map with aerial photographs of the same area is often useful under field conditions for the one may clarify that which is omitted or obscured on the other. The process is especially useful in developing a knowledge of the aerial photograph. Plate 15 is a map which has overprinted thereon the boundaries of aerial photographs shown in Plates I, II, III and V which follow.

The following work is recommended as an aid to study.

Compare each of the plates with the map of the same area with regard to:

- (1) The road net.
- (2) The wooded areas.
- (3) The drainage system.
- (4) The works of man.

(5) Trace out on a sheet of overlay paper the drainage system (stream lines) of Plates IV and X, and compare with the map.

(6) Plot the ridge structure of Plates IV and X and compare with the map for basic terrain structure.

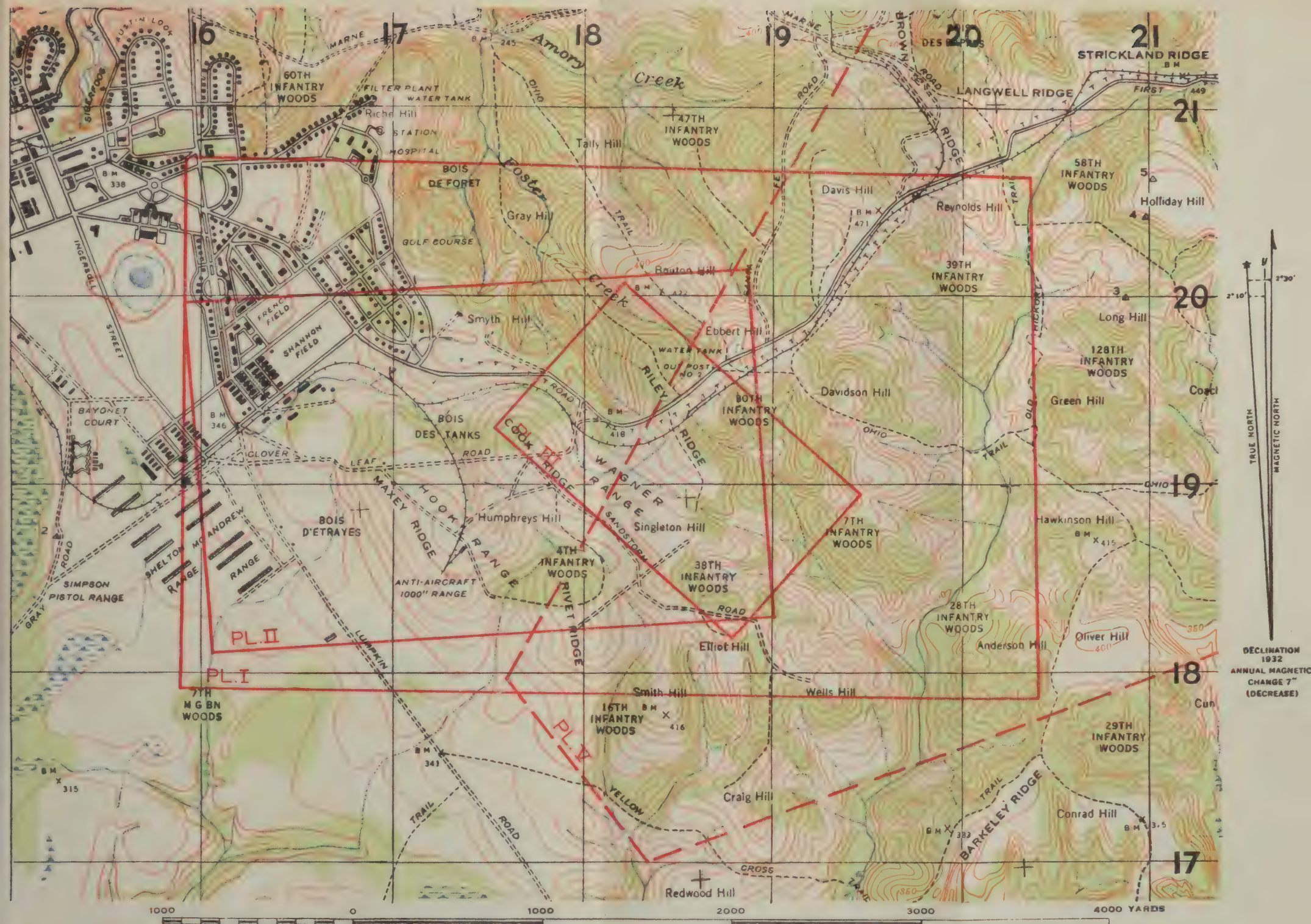


Plate 15. Plot Map of Photographs Shown in Plates I, II, III and V.



Plate I. Vertical Photograph 1:22,000.

Photo by Air Corps, U. S. Army



Plate II. Vertical Photograph. 1:14,000.

Photo by Air Corps, U. S. Army



Plate III. Vertical Photograph. 1:8,000.

Photo by Air Corps, U. S. Army



Plate IV. Vertical Photograph.

Photo by Air Corps, U. S. Army



Plate V. Oblique Photograph. 3000 feet.

Photo by Air Corps, U. S. Army



Plate VI. Oblique Photograph. 5000 feet.

Photo by Air Corps, U. S. Army



Plate VII.

Photo by Air Corps, U. S. Army



photo by Air Corps, U. S. Army

Plate VIII.



Plate IX.

Photo by Air Corps, U. S. Army



Plate X. Typical Drainage System.

Photo by Air Corps, U. S. Army



Plate XI. Types of Minor Drainage.

Photo by Air Corps, U. S. Army

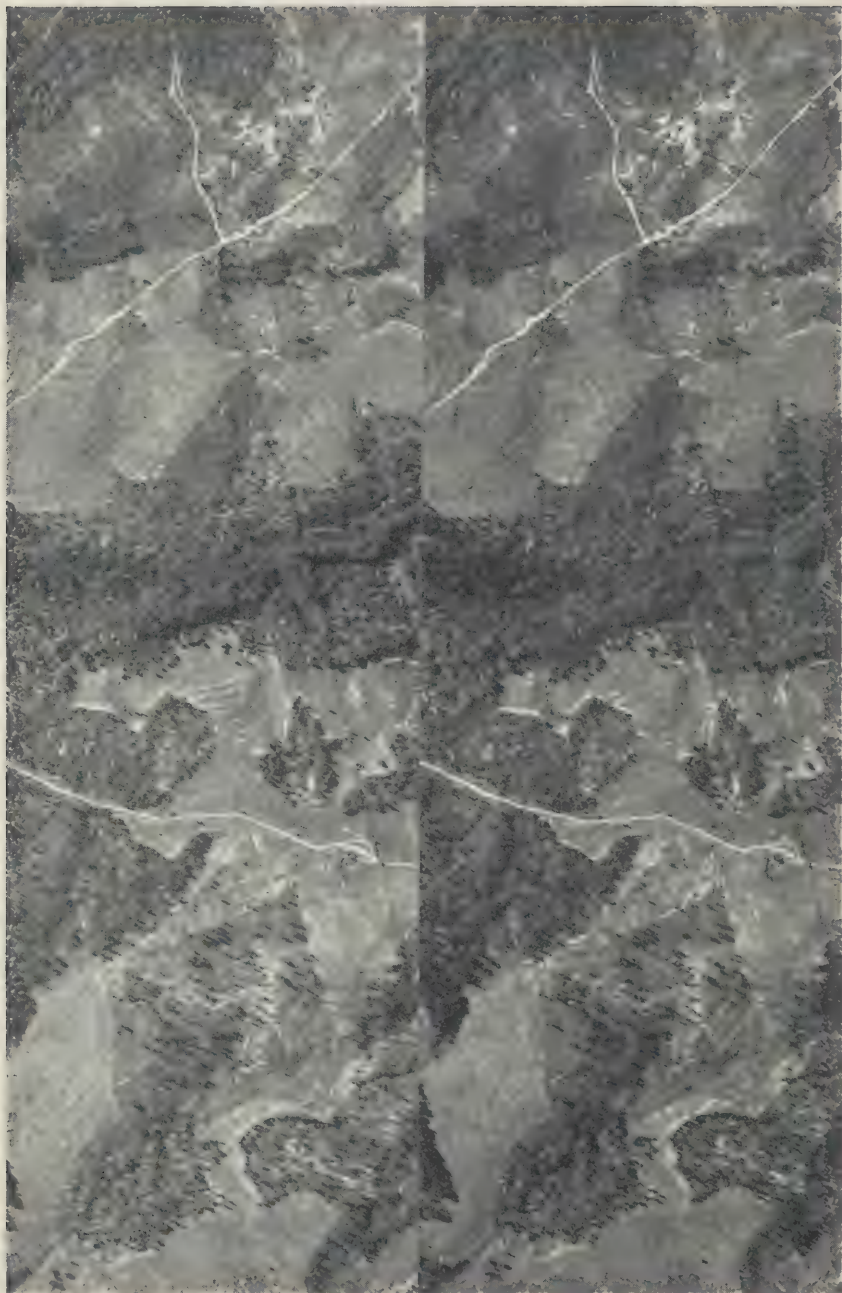


Plate XII. Stereoscopic Pair. Photo by Air Corps, U. S. Army

CHAPTER XII

CARE AND OPERATION OF MOTOR VEHICLES

THE FUNCTION OF UNITS OF THE MOTOR VEHICLE

Introduction. The horse is being forced off the battlefield and animal-drawn military transport is rapidly being displaced by motors. Armies of the world are rapidly being adjusted to the speed of the motor vehicle, both tactically and strategically. Thus instruction in the Care and Operation of Motor Vehicles becomes a very important subject in the military education of the officer.

The twenty-eight million motor vehicles registered in the United States, the large plants turning out replacements, and the enormous army of maintenance and service personnel represent one of our greatest assets for national defense. The automotive industry is highly specialized, from men like the engineering head of General Motors, to the mechanic in the shop, who finds it necessary to specialize, say, in carburetor work, if he would do a good job.

While this specialization is also found in the Army, the scope of this text does not extend beyond the company.

The company commander of an ambulance company of a medical regiment cannot be expected to be a qualified motor vehicle fleet operator; in civil life this is the job of an experienced and technically trained executive. Though the motorized ambulance company commander may know little of the mechanical details of a vehicle, he and his drivers can and should be the most important cogs in the wheel of automotive maintenance. The personnel can often increase the mileage before sending the vehicles to the next higher echelon for repair.

The first important aim of this part of the text is to point out how the company echelon may do this—even though it is permitted to perform very little mechanical work. Its functions are *careful driving, proper lubrication, inspections, and other preventive maintenance measures*. These form the foundation for the second aim of the text—instruction in the successful operation of motor vehicles, singly and in convoys.

Cylinder and Piston. The parts and method of operation of the gasoline engine are quite simple in their elementary form. Let us start with the cylinder. It is merely a tube closed at one end, and has about the same size and proportions of a tall coffee can. A piece of pipe with one end closed would also make a cylinder. Many engines used in early automobiles actually had cylinders made from cast iron pipe. (Plate 1.)

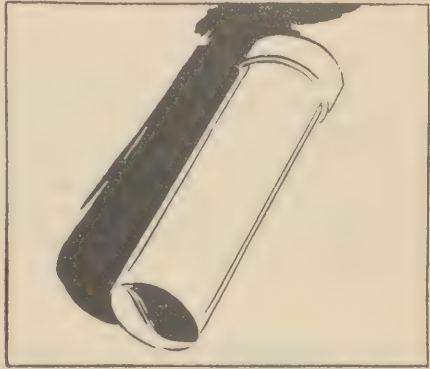


Plate 1.

Inside this cylinder a closely fitting piston slides up and down. This combination gives us a pump similar to the familiar tire pump, which pumps air each time the piston moves up and down. An automobile engine pumps from twenty-five to fifty gallons of air mixed with from $\frac{4}{10}$ to one pint of gasoline, for each mile it travels. The amounts depend upon the size of the engine. (Plate 2.)

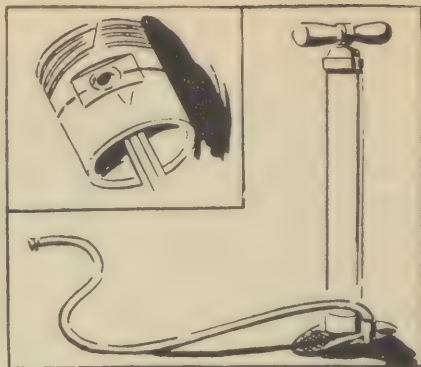


Plate 2.

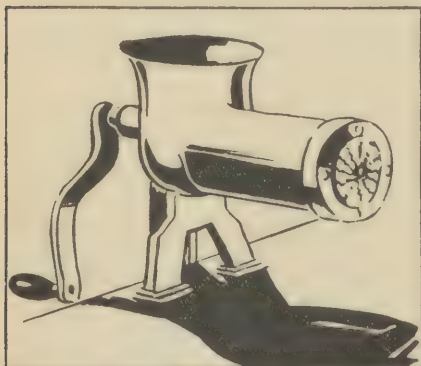


Plate 3.

shaft; your arm or leg, as the case may be, is the connecting rod which transmits the power. At the maximum speed of the car the crankshaft may be revolving over 4000 times a minute. Each time the crankshaft makes one revolution the car moves ahead about half a yard. Of course in engines with more than one cylinder, the crankshaft has a number of cranks. (Plate 4.)

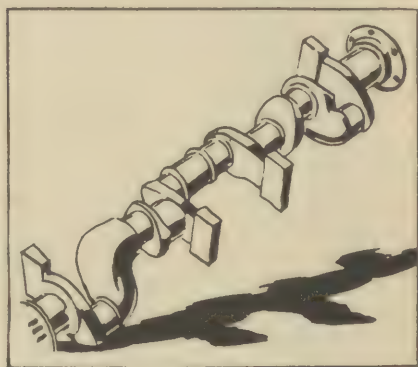


Plate 4.



Plate 5.

The Flywheel. On one end of the crankshaft, a heavy wheel called a flywheel is mounted. If we turn the emery wheel by hand very rapidly and then let go, the wheel will continue to revolve. (Plate 5.) This is the same action as in the flywheel. It keeps the engine turning between power impulses. (Plate 6.)

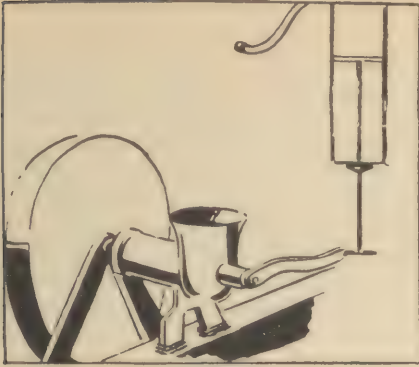


Plate 6.

Valves. The power impulses in an internal combustion engine are derived from successive explosions of a gasoline-air mixture.

The engine must have doors which will open and close to allow the mixture of gasoline and air to enter the cylinder and the burned gases to pass out again at the proper time. The drafts on your stove or furnace control the intake of air and outlet of burned

gases. Likewise, the valves in the engine let the gases in or out. In the furnace we can take our time about opening and closing the drafts, but in an engine the valves must open and close in less than one hundredth of a second. (Plate 7.)

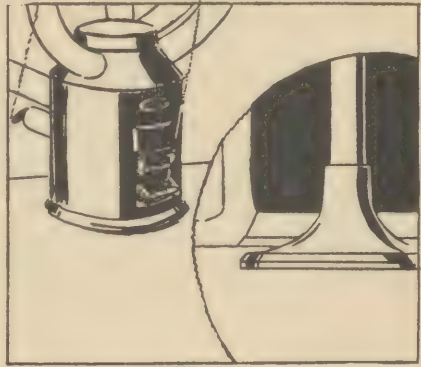


Plate 7.

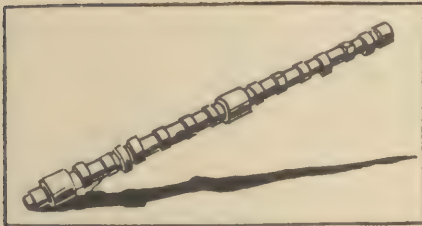


Plate 8.

Cams and Camshafts. It is necessary to open and close the valves automatically at exactly the right time. The cams and the camshaft are provided to do this. A cam is a device to convert rotary motion into up and down motion of the valves. (Plate 8.)

The cam works something like the off-center wheel on the wheelbarrow pictured in Plate 9. The camshaft is made up of a series of cams, a cam for each valve. The camshaft is driven by the crankshaft and rotates at exactly one-half the speed of the crankshaft.

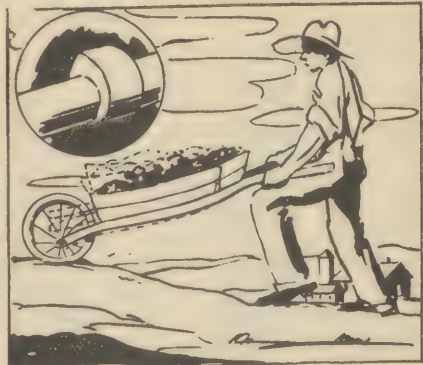


Plate 9.

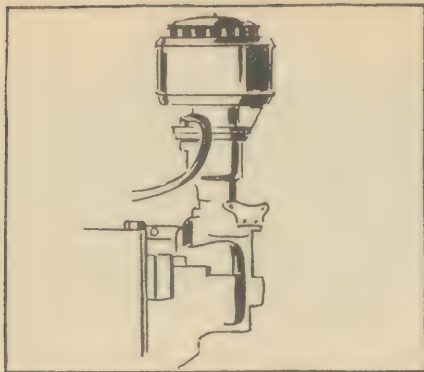


Plate 10.

liquid and mixes it with the air. For every pound of gasoline about fifteen pounds of air are normally necessary to obtain the correct proportions for a good burnable mixture. For each gallon of gasoline a ten-foot-square and twelve-foot-high room full of air is required. For starting, and for accelerating, a richer mixture is necessary. Various devices built into the carburetor make it possible to

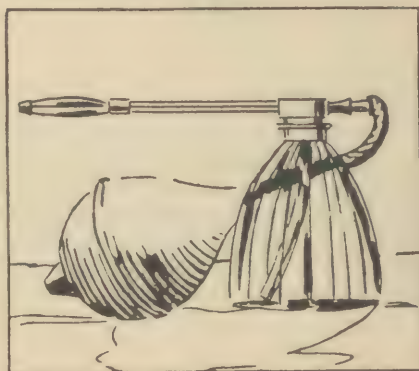


Plate 11.

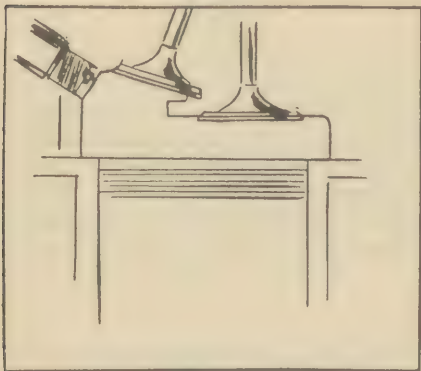


Plate 12.

obtain a mixture containing more gasoline for each pound of air. (Plate 12.)

obtain a mixture containing more gasoline for each pound of air. (Plate 12.)

Combustion Chamber. At the top of the cylinder, above the piston, is a space called the "combustion chamber," where the mixture of air and gasoline is burned. It is into this space that the mixture is compressed. If the space is small the gas is compressed very much. If the space is large, it is not

compressed as much. We call an engine with a small compression space, a high compression engine. (Plate 13.)

Compression Ratio. Compression ratio is a term used to describe the extent of the compression in the combustion chamber. The volume of the cylinder and combustion chamber is measured in cubic inches, although we could just as easily use quarts or gallons. (Plate 13.)

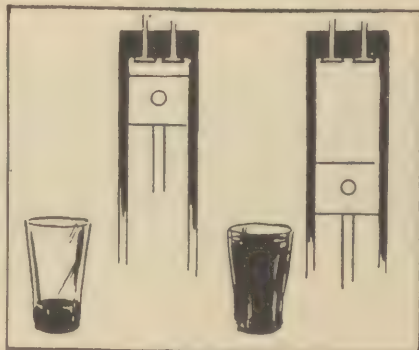


Plate 13.

To obtain the value for compression ratio, let us take one cylinder of an engine. Turn the crankcase over until the piston is at the bottom of the cylinder. Now let us measure the volume of the space above the piston including the combustion chamber. To do this, we can fill the space with oil and then drain the oil out and measure its volume. Suppose we find we have 50 cubic inches of oil.

Then let us turn the crankshaft until the piston is at the top of the cylinder. Again, we fill the space above the piston with oil and measure its volume. Suppose we find it is ten cubic inches. The compression ratio is then the volume with the piston at the bottom divided by the volume with the piston at the top. In this case since 50 divided by 10 equals 5, the compression ratio is then 5 to 1.

This means that, if the cylinder is full of gas when the piston is at the bottom, the gas will occupy five times the volume that it does when the piston is at the top. That's all there is to compression ratio. The value for compression ratio in automobile engines varies between 5 to 1 and $6\frac{1}{2}$ to 1.

Fuel Pump. To bring the liquid gasoline from the tank in the rear to the carburetor requires the fuel pump. It operates in a manner similar to the old water pump. Each stroke of the pump pulls gasoline from the tank in the rear and deposits it in the carburetor. (Plate 14.)

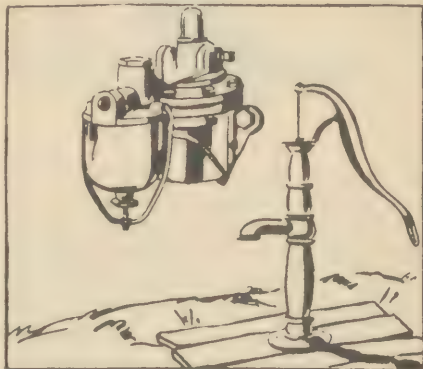


Plate 14.

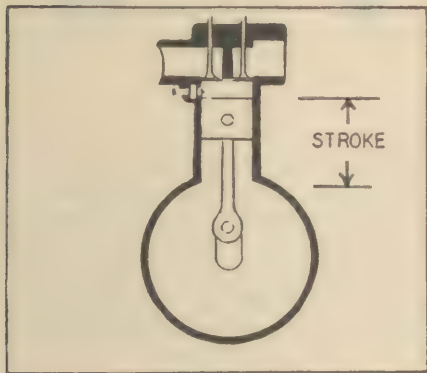


Plate 15.

Four-Stroke Cycle. All of the above operations must go on in an orderly fashion, each event occurring at the proper time and for the correct duration of time. The schedule on which the engine runs to do this is called the four-stroke cycle. A stroke is one movement of the piston from one end of the cylinder to the other; from top to bottom, or from bottom to top. The four-stroke cycle simply means that the schedule each

cylinder works on requires four strokes of the piston—first down, then up, again down, and last, up. (Plate 15.)

A four-cycle engine and a muzzle-loading cannon have much in common. In the engine, the first down stroke of the piston is the intake stroke which pulls the mixture in to fill the cylinder. At the bottom of the stroke when the cylinder is full, the intake valve closes. (Plate 16.)

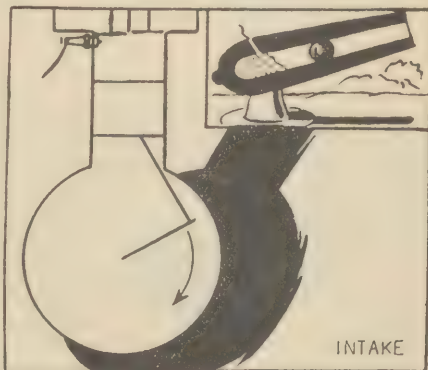


Plate 16.

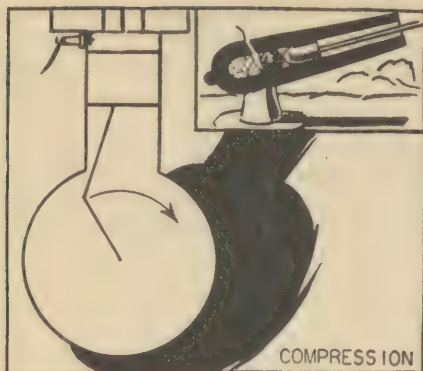


Plate 17.

Between the second and third stroke, firing occurs. In the cannon the initial fire may be applied by a match. In the engine an electric spark occurs at exactly the right time after the gas is compressed. The pressure in the cylinder is raised to about 400 pounds per square inch in a fraction of a second by the burning of the mixture of air and gasoline. The burning of powder produces a high pressure in the cannon. (Plate 18.)

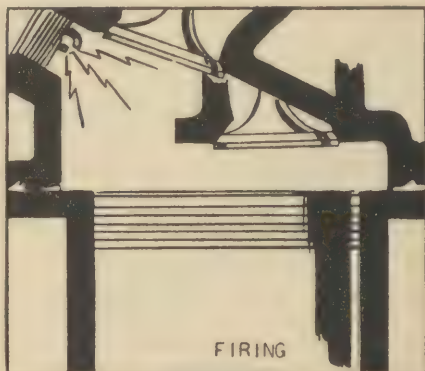


Plate 18.

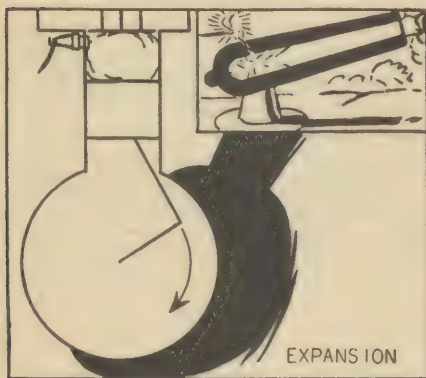


Plate 19.

The next down stroke is the power stroke. The hot gases, expanding against the wall of the enclosed chamber, push the piston, the only movable part, downward. In the cannon the movable part is the ball which is forced out of the mouth of the cannon by the burning of the powder. (Plate 19.)

The last stroke is the exhaust stroke. The gases have now spent their energy in pushing the piston downward and it is necessary to clear the cylinder to make room for a new charge. The exhaust valve opens and the piston, moving upward, forces the burned gases out. In the cannon the ramrod is used to clear out the burned powder and gases. (Plate 20.)

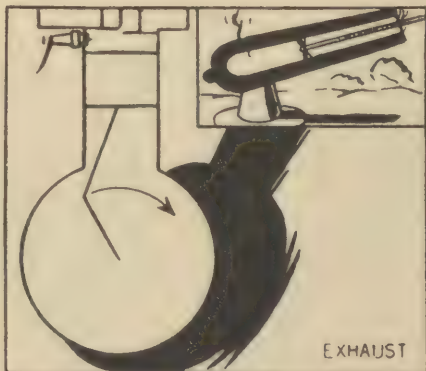


Plate 20.

The Spark Plug and the Distributor. The light which starts the mixture burning is the spark plug. We are familiar with many devices similar to the spark plug, although we don't often think of them in that way. In the cigar lighter, a spark is caused by friction on a piece of special spark metal. In the spark plug it is caused by an electric current jumping a gap. (Plate 21.)

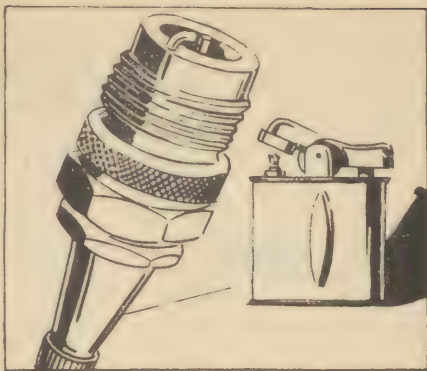


Plate 21.

The spark must start the mixture burning at the right instant. The distributor sees to it that each spark plug fires at the correct time. In many clocks, chimes ring for every hour. The distributor is like a one-handed clock that keeps time for the engine, sending electric current to jump the spark plug gap at the proper time, just as a clock strikes at the proper time. Instead of the usual hours on the clock face, Plate 22 shows the number of the cylinders. Each time the hand passes these points the proper circuit is closed so that the correct spark plug fires. At one o'clock by the engine's clock, the spark plug in number one cylinder fires; at three o'clock, number three fires, and so on for each cylinder.

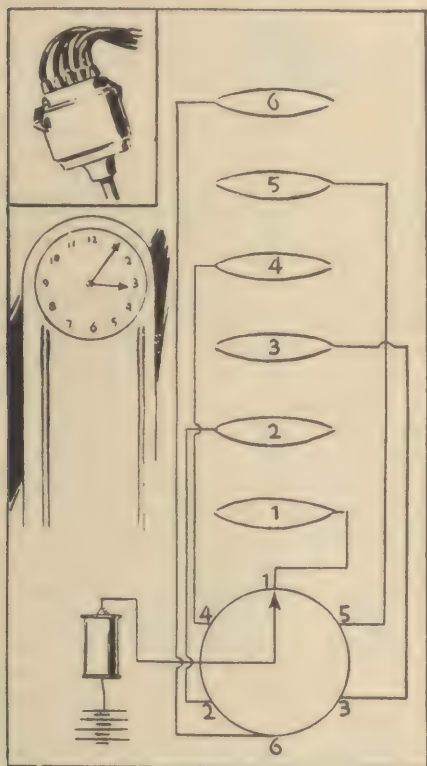


Plate 22.

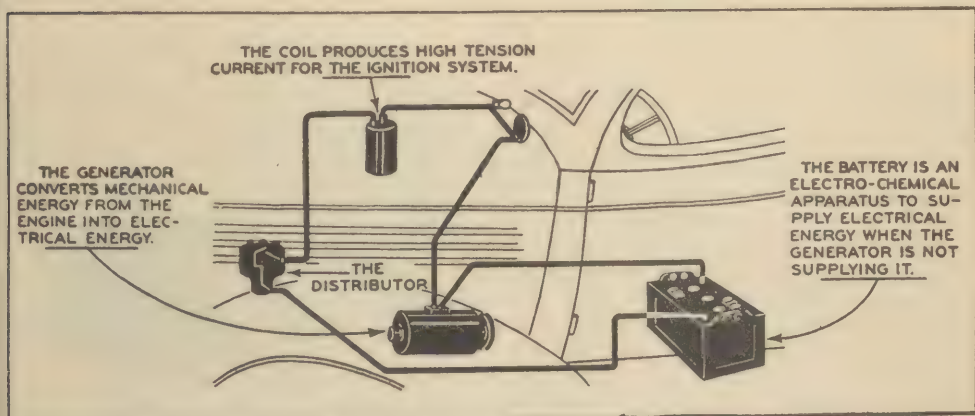


Plate 23. Source of electrical energy.

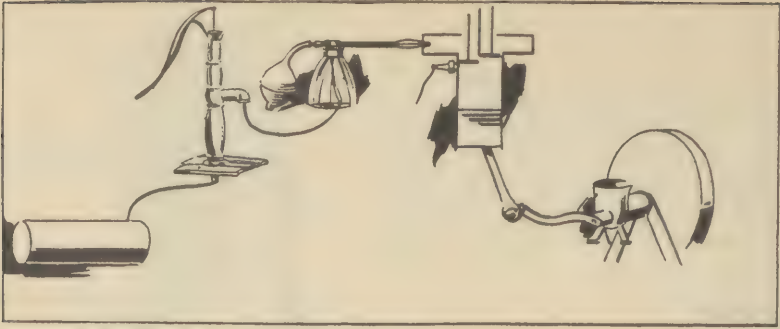


Plate 24.

Resume. Let us summarize the information we now have about the engine. Its operation is very simple. A fuel pump brings the gasoline to the carburetor. The carburetor mixes it in the right proportions with air and delivers it to the cylinders through the valves. The mixture is burned in the cylinder and converted into mechanical power. The piston moves up and down so as to cause the crankshaft to rotate. We now have the chemical energy in the gasoline converted into useful work. (Plate 24.)

Cooling System. Temperatures of 4000 to 4500 degrees Fahrenheit, or almost twice the temperature necessary to melt iron, are produced in the cylinder. If cooling were not provided, the pistons, valves and cylinder head would be only molten, misshapen pieces of metal in a short time. The easiest way to cool the engine is to provide a water jacket around the hottest parts to carry away the heat.

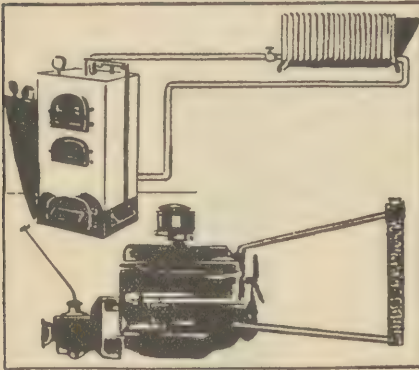


Plate 25.

Let us consider the engine, from the cooling standpoint, as a device for producing heat and liberating it to the air. The problem of the cooling system is very similar to that of the heating system in your home. In the engine, heat is taken up by the water in the jackets around the cylinders and conveyed to the radiator where the heat in the water is given up to the air. The action of the hot water or steam furnace is similar. The furnace boiler is the engine, the steam radiators the radiator on the car. (Plate 25.)

The 100 horsepower automobile engine, must have a 150 horsepower radiator. For every horsepower of work produced by the engine, heat equivalent to one and a half horsepower must be carried away by the cooling system. (Plate 26.)

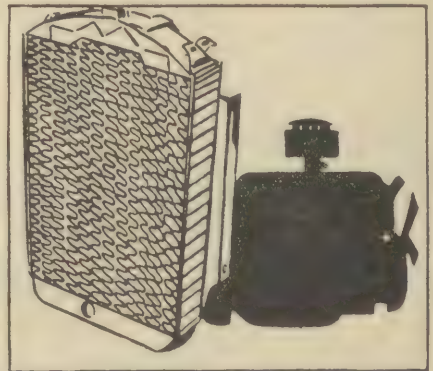


Plate 26.

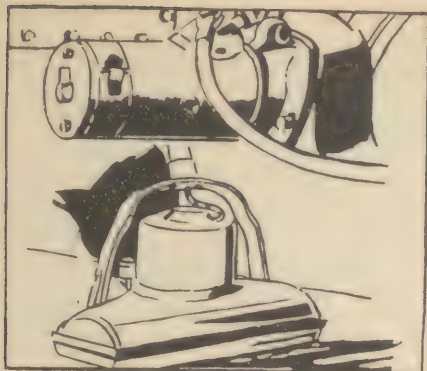


Plate 27.

The starting pedal or button is nothing but an electric switch like a wall switch which turns on the lights in a room. In addition to turning on the motor, the starter pedal must connect the starter motor to the engine so it can turn the engine over. (Plate 28.)

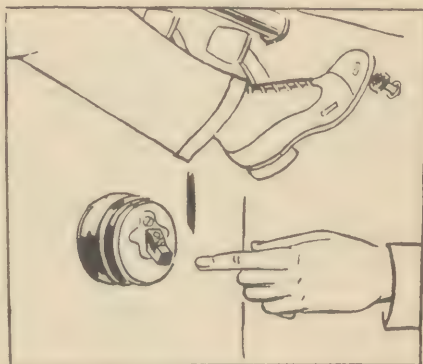


Plate 28.

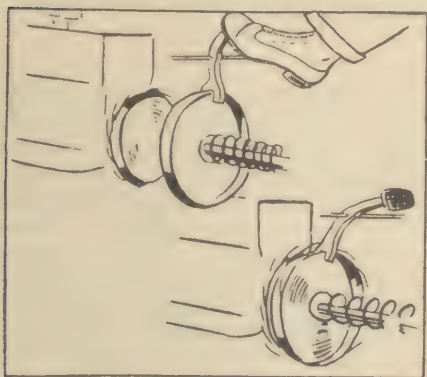


Plate 29.

The Clutch. At this point we have a complete engine with a method of both starting and cooling it. The next step is to transfer the power or turning effort back to the rear wheels.

The engine must be able to run when the car is stationary. Therefore it is necessary to be able to disconnect the engine from rear wheels. A mechanism called a clutch, operated by a foot pedal, does this. Suppose we mount two ordinary pie plates, each on a shaft, as shown in the Plate 29. Set one disc spinning. The other one can be started

spinning by bringing it into contact with the first one. This is the principle of the single disc clutch used in most automobiles. One plate is fixed to the flywheel, the other to the transmission. Moving the two plates together connects the flywheel with the transmission.

The Transmission. It also is necessary to be able to choose the relationship of the speed of the engine to that of the rear wheels. The automobile engine develops its greatest power when it is turning fast. It is therefore necessary to be able to allow the engine to run fast, even though the car is going slowly. This gives high turning effort at the rear wheels for rapid pick-up, good hill climbing and heavy pulling. When the car gets up speed it is desirable to allow the engine to run slower to give good fuel economy. The transmission, or as our English cousins call it, the gear box, accomplishes this for us. To demonstrate this action, consider an ordinary clock. The hour hand moves slowly and is very difficult to stop with your finger. The minute hand is much easier to stop and the second hand requires but a touch. (Plate 30.)

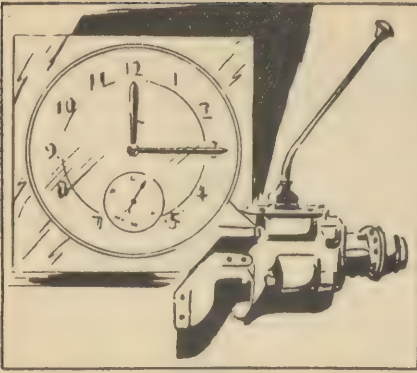


Plate 30.

there are 50 teeth on the large gear and 10 teeth on the small ones, the beaters will turn five times for one turn of the handle. Varying the size of the gears varies the speed. The egg beater can thus be thought of as one speed in the automobile transmission. (Plate 31.) For a three speed transmission we simply have three sets of gears of different sizes, and a method of allowing the driver to choose the set of gears he wishes to use. The gear shift lever allows the driver to choose any gear-set which he needs; low, second, or high. A fourth set reverses the direction of rotation and allows him to back up.

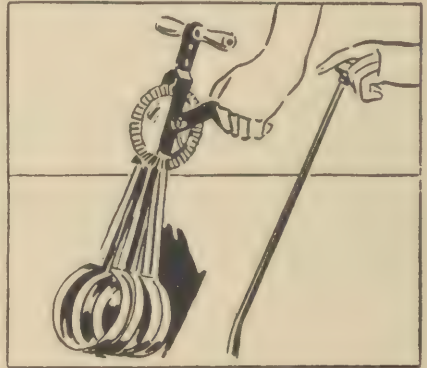


Plate 31.

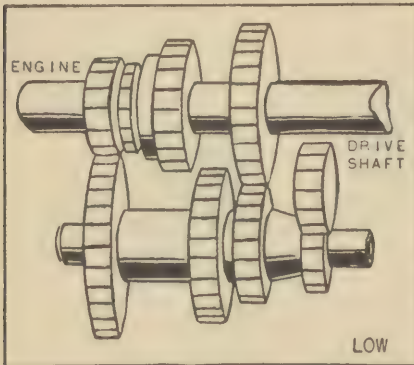


Plate 32.

sult. A small gear, on the lower shaft, meshes with a large gear on the upper shaft. In a transmission about three and a half turns of the engine will make one turn of the drive shaft. The lower shaft is rotated through the set of gears driven by the engine. The top gear can slide back and forth on flutes cut into its shaft. When you shift into low, you slide this gear into mesh.

Now that the car is started, it is necessary to be able to increase the speed. There is no

Let us build up a three-speed transmission, with reverse, to illustrate its operation. First, we need high turning effort to start the car moving, or to pull out of holes. The engine of the car must be running at a high speed to develop this high turning effort, or torque, as the engineer calls it. The car, however, is not moving. We then need a set of gears which will allow the engine to rotate fast while the car is going slowly. Plate 32 shows a set of gears which will accomplish this re-

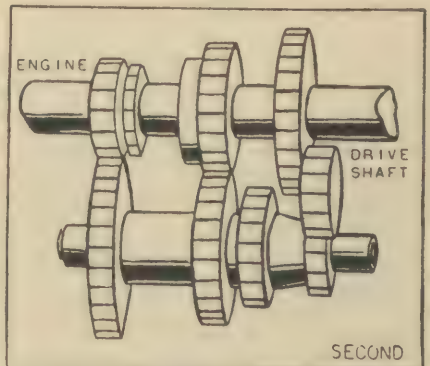


Plate 33.

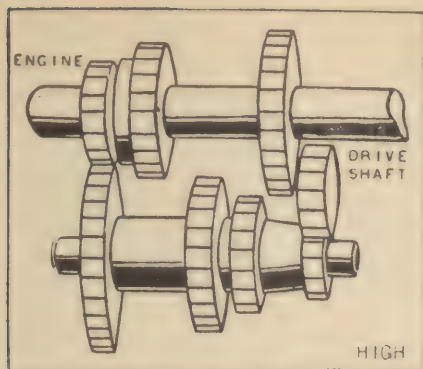


Plate 34.

section meshes with flutes on the inside of the small gear which is driven by the engine. One turn of the engine will make one turn of the drive shaft.

It is necessary to be able to run the car backward with the engine running in the same direction as it does for forward motion. To accomplish this, another small gear is added. When two gears run in mesh, the shafts on which they operate will turn in opposite directions. If we place a third gear between the two gears, the shafts will turn in the same direction. Here, then, is a method of chang-

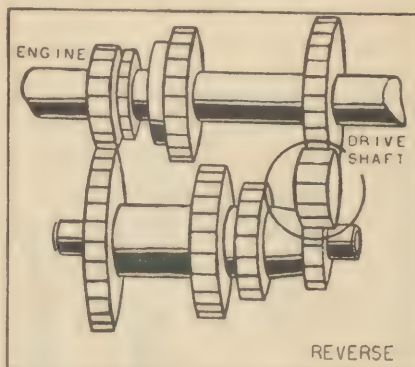


Plate 35.

ing the direction of rotation of two shafts. The small third gear shown in Plate 35 reverses the direction of rotation of the drive shaft from that in the previous speeds.

All gears may be disengaged so that the engine and the drive shaft have no connection. This position is called *neutral*.

We now have a complete transmission with three speeds forward and one reverse. These are mounted in a metal case filled with oil to lubricate the gears and bearings. Plate 36

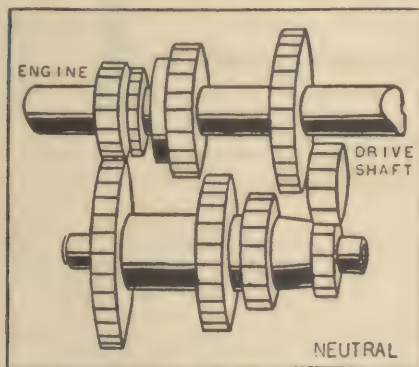


Plate 36.

shows the complete transmission with the gears in the neutral position.

The Drive Shaft. The propeller shaft, or drive shaft, is simply a solid or hollow steel shaft for connecting the transmission with the rear axle drive gears. The universal joint allows movement of the rear axle without bending or breaking the drive shaft. It acts something like the gimbal on a compass which allows the face of the compass always to be level, no matter how the ship rolls or pitches.

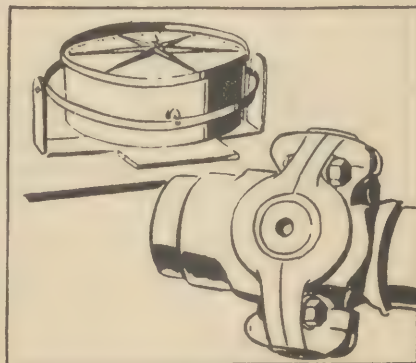


Plate 37.



Plate 38.

Note, in Plate 38, how the flank man covers more ground than the pivot man when a rank of soldiers turns a corner. To do it the pivot man takes a half step while the flank man keeps up the full-step.

Let us examine the differential in detail. In Plates 39 and 40, "L" indicates the left rear wheel axle and "R" the right. The two beveled gears (AG) attached to these axles are not connected with one another, hence either rear wheel can turn over independently of the other.

Now add the piece called the frame, "F" (Plate 40). The purpose of the frame is to carry an additional gear and to transmit power, both of which will be explained later. The frame "F" is slipped on the wheel axle "L" in such a manner that the frame can rotate about the axle or the axle can turn while the frame remains stationary.

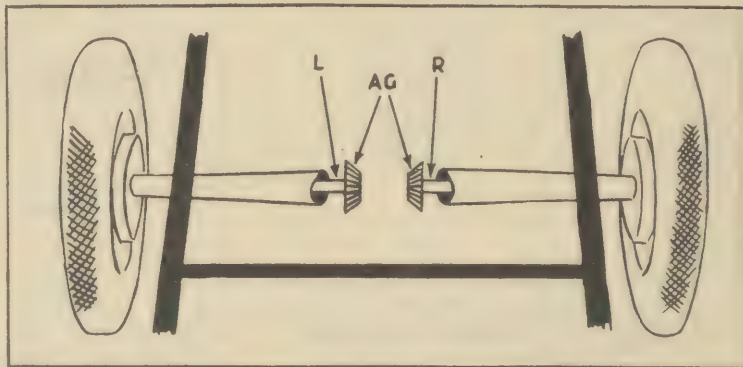


Plate 39.

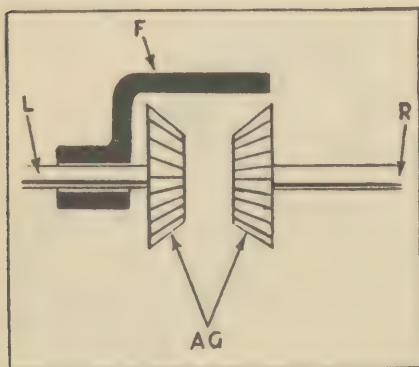


Plate 40.

The Differential. When an automobile goes around a corner, the "outside" rear wheel must cover more distance than the "inside" rear wheel and do it in the same length of time. The outside wheel must therefore turn over faster than the inside wheel during the turn. Since both wheels are rotated by the drive shaft, which turns over uniformly, the drive shaft *cannot be meshed directly* to the wheel axles, for then both rear wheels would always have to revolve at the same speed, turning corners or not. An assembly called the *differential* is therefore provided to enable the car to turn corners with ease.

A third small beveled gear is now added ("FG," Plate 41). Gear "FG" meshes into the axle gears ("AG"). Its shaft "S" is carried by the frame ("F"). This gear is free on its shaft either to rotate or idle. With the assembly so far constructed (Plate 41), let us study what we have. First the axle gears ("AG") and the small frame gear ("FG") are at right angles to one another. Assuming that the rear wheels are jacked up, we could take hold of the frame ("F") and by rotating it, we would also rotate both rear wheels; the small frame gear ("FG") moves with the frame but does not rotate around its own shaft ("S"), in this case. Suppose, however, that we now slow down one or the other

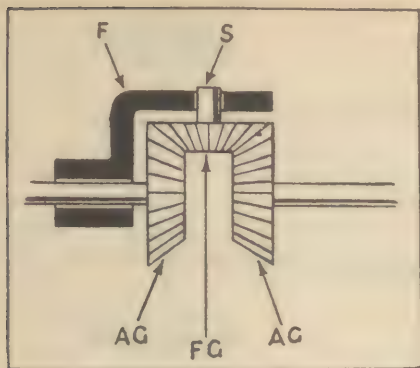


Plate 41.

gears ("AG") change their relative rates of speed the small gear "FG" starts rotating on its own shaft and thus accommodates the difference in the speed of the rear wheels. This is the whole secret of the differential and why the automobile can turn corners under power.

But, so far, we have no power, so let us add it. See Plate 42. The power of the engine comes through the drive shaft, at the differential end of which is the fixed beveled

of the rear wheels, say the left. This would require that its axle gear ("AG") slow down accordingly. The frame "F" and the shaft of the small gear "FG" continue to turn around the axles at the original rate. How, then, with "L" turning slower than "R," can the assembly continue to function? Remember that when both wheels were turning at the same speed, the small gear "FG" did not revolve around its own shaft ("S"). Just as soon as one wheel axle is slowed down (or speeded up for that matter) and thus the

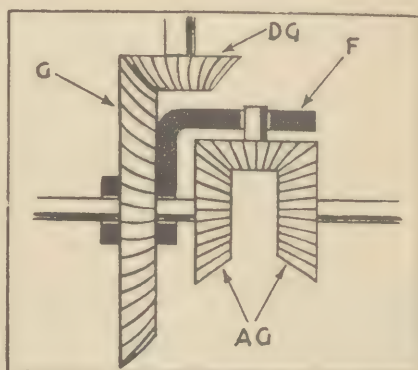


Plate 42.

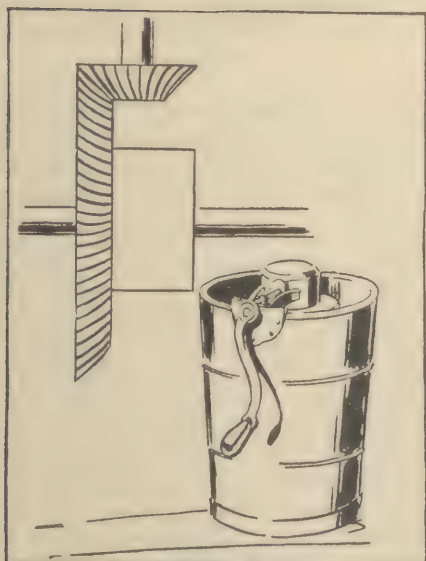


Plate 43.

gear "DG." A large beveled gear "G" is now rigidly attached to the frame "F" and meshed with the drive shaft gear "DG." When the power of the engine rotates the drive shaft, this power is transmitted to the frame through a right angle (similarly to the manner in which an ice cream freezer works) Plate 43, and rotates the frame about the rear wheel axles (in a direction which is at right angles to that of the rotation of the drive shaft); thus we also see how power also goes around a corner. The frame, through its small gear "FG," passes the power to the rear wheels.

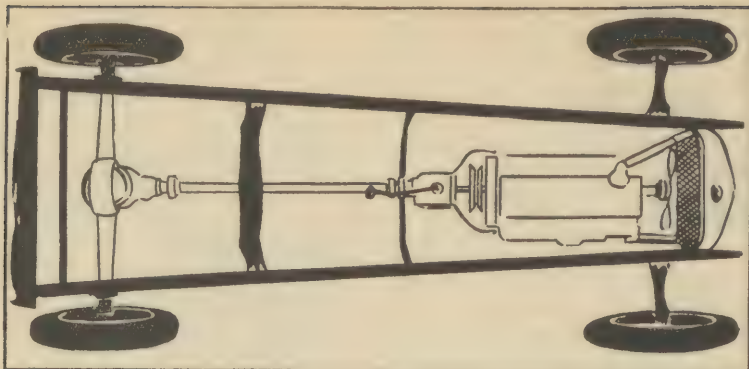


Plate 44.

Having discussed the detail of the differential, now let us summarize its operation.

The power of the engine rotates the drive shaft gear "DG." This is transmitted to the frame "F" through the beveled gear "G" and rotates the frame around the axles. The frame carries the small gear "FG" around with it. This small gear meshes into the wheel axle gears ("AG"), transmits the power to the rear wheels and causes the automobile to move ahead. When the automobile continues to move straight ahead, the power applied by the frame goes equally to each rear axle, hence the small gear cannot rotate around its own shaft, but merely moves around with the frame as if it were a fixed part. However, let the automobile turn a corner so that one or the other of the rear wheels must turn over faster than the other. Then the small gear "FG" does start rotating on its own shaft and thus "takes up the slack" in all the differences in the various speeds of rotation which are involved.

Now let us add all the parts from the engine to the rear wheels, including the front axle to support the front of the vehicle, the steering gear to enable the driver to direct the movement of the vehicle, the frame to support the power plant, transmission, and the body, and the springs to dampen the road shocks. The operation of each part is seen to be quite simple. Likewise the operation of the group of parts as a whole is simple.



Plate 46.

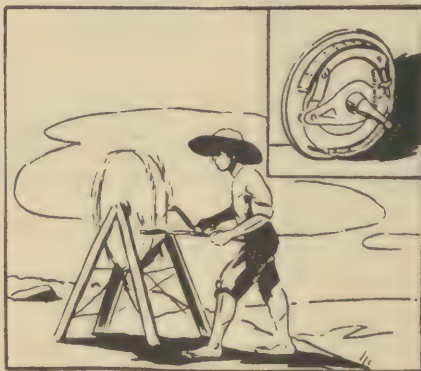


Plate 45.

Brakes. To stop the automobile, brakes are provided. Brakes are simply a method of applying friction to the rotating wheels to stop them. If you rotate a wheel, it will coast for some time. But let a piece of wood or metal be pushed against the rim of the wheel and it can be stopped quickly. In the automobile brake we press a piece of brake lining, especially made to last long and not burn up, against a metal drum. (Plate 45.)

The engine is a device for converting heat into useful work. The brake converts work into heat. We are all familiar with the fact

that friction causes heat. When we strike a match, the friction heats up the head until it is lighted. Plate 46 shows a prehistoric man starting a fire by friction of one piece of wood on another. The brake on an average automobile must convert as much as 500 horsepower of work into heat in stopping a car from 70 miles an hour. This heat is distributed to the air. The 100 horsepower car must have 500 horsepower brakes.

The foregoing Plates and descriptions have demonstrated the elementary principles of the automobile. Of course, the modern automobile has many improvements and refinements on the simple mechanism described in the preceding pages. The engineer has worked to obtain durability, economy, safety, low cost, smoothness and performance, to mention only a few things. Many changes and additions have been made on the simple device first used. The improvements have far overshadowed the original form. However, an understanding of these basic principles should be gained before studying the refinements.

LUBRICATION

General. The life of the engine, transmission, differential, and other moving parts of the motor vehicle, depend primarily upon a thin, tough film of oil—*oil plating*—about two thousandths of an inch in thickness, which prevents metal to metal contact. This film is often subjected to pressure greater than 2000 pounds per square inch and, in the combustion chamber, to temperatures as great as 4000° F.

To the company commander, "lubrication" is the most important service operation. If neglected, there is a consequent reduction in vehicle life.

Lubricants are much cheaper than costs of repairs and should be applied regularly if the maximum useful service is to be gained from the vehicle. To this end, therefore, it is important that the proper grades of lubricants be used in accordance with a definite schedule.

Engine Lubrication. *a.* All of the vital working parts of the engine proper are lubricated by the oil in the crankcase which is constantly being circulated through the engine by the oiling system. When the engine, shown in Plate 47, is running, the oil pump (A) forces oil from reservoir (B) up through the oil distributor line (C) to all the main bearings, connecting-rod bearings, and piston pins. As the speed and power of engines have increased, a greater need has developed for better lubrication that will positively protect the hundreds of tight-fitting and fast moving engine parts. This system is known as the force-feed system. In addition, there are the force-feed-and-splash system and the splash system with circulating pump.

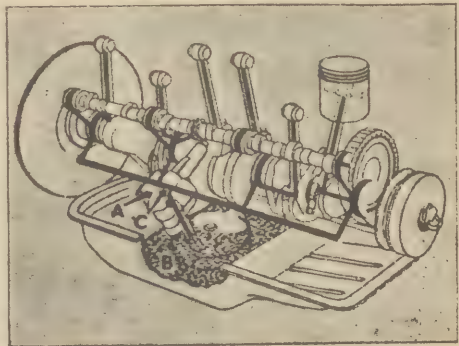


Plate 47.

b. Engine oil recommendations. Today, engine lubricants, instead of being referred to as either heavy, medium, or light grade, are classified according to number. The number system, known as the S.A.E. Viscosity Number System, classifies lubricants in terms of viscosity or fluidity. (S.A.E. means "Society of Automotive Engineers.") Lubricants of low number designation, such as S.A.E. 10, flow more readily than lubricants of higher numbers, S.A.E. 20 or 30. The S.A.E. number refers to viscosity alone. These numbers in no way refer to the quality or other characteristics of lubricants.

Because of the close relationship of engine lubricants to easy starting at all temperatures, and to minimum engine wear and economy, it is important that the recommendations made by motor vehicle manufacturers on lubrication and on the lubrication charts included in their shop manuals be followed.

The oil refiners or marketers are responsible for the quality of their product.

c. Fall-winter-spring. During the colder months of the year, an oil should be used that will permit easy starting at the lowest temperature which is likely to be encountered.

The same consideration that guides one in determining the strength of anti-freezing solution must be used in selecting crankcase oil throughout the winter. When the crank-

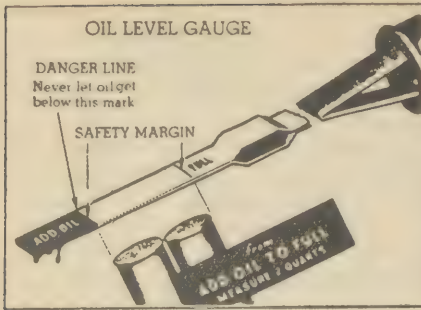


Plate 48.

case is drained and refilled, oil should be selected on the basis of the viscosity or fluidity for the anticipated minimum temperature. Otherwise, if the viscosity is too high, difficulty in starting will be experienced at each sudden drop in temperature.

The viscosity grade of crankcase oil will, therefore, depend upon the climatic conditions under which the car is operated. The grades best suited for use, for example, in one high grade 1940 model at the various temperatures are shown in the following table:

If you anticipate that the minimum atmospheric temperature will be

Use the grade indicated

Not lower than 32° F	20-W or S. A. E. 20
As low as plus 10° F	20-W
As low as minus 10° F	10-W
Below minus 10° F	10-W plus 10% kerosene

NOTE: A 20-W oil is of lower viscosity than a 20 oil and a 10-W oil is lower than a 10. During the first 1000 miles a 20-W oil should be used both in summer and winter.

10-W oil, plus 10% kerosene, is recommended only for those territories where the temperature falls below minus (—) 10° F for protracted periods.

d. Summer. S.A.E. 30 oil should be used in this particular car throughout the summer months when the average daylight temperature is expected to reach 90° F, or above.

e. Maintaining oil levels. Check the oil level frequently and add oil when necessary. It is good economy to let the oil level approach the "Add Oil" mark before having your oil changed. Always be sure the crankcase is full before starting out on a long drive.

When to Change Crankcase Oil. Improved oils, changed driving conditions, and improvements in engines, such as the crankcase ventilating system, have greatly lengthened the life of good lubricating oils. However, to insure continuation of best performance, low maintenance cost and long engine life, it is necessary to change the crankcase oil whenever it becomes contaminated with harmful foreign materials. Under normal driving conditions draining the crankcase and replacing with fresh oil every 2000 or 3000 miles is recommended by most manufacturers. However, the oil should be changed after the first 500 miles of vehicle operation. Also, under adverse driving conditions it may become necessary to drain the crankcase oil more frequently than 2000 or 3000 miles.

Driving over dusty roads or through dust storms introduces abrasive material into the engine. Air cleaners decrease the amount of dust that may enter the crankcase; however, if oil becomes contaminated, it should be drained promptly to prevent harmful engine wear. The frequency of draining depends upon the severity of dust conditions and no definite draining periods are recommended.

Short runs in cold weather, such as city driving, do not permit thorough warming up of the engine, thus water may accumulate in the crankcase from condensation of moisture produced by the burning of the fuel. Water in the crankcase may freeze and interfere with the proper oil circulation. It also promotes rusting and may cause clogging of oil screens and passages. Under normal driving conditions this water is removed by the crankcase ventilator, but if water accumulates, it should be removed by draining the crankcase as frequently as may be required.

During winter months light or low viscosity oils are required to obtain easy starting. Therefore, at the beginning of the winter season, the crankcase should be drained and refilled with oil of the proper viscosity for winter use. On continuous hard driving these

light oils may thicken and cause starting trouble. More frequent oil changes may, therefore, be required during the winter months, and a drainage period of 2000 miles for cars subjected to high speed driving conditions may be desirable; but, under severe conditions, more frequent draining may be required to prevent starting troubles due to thickened oil.

It is always advisable to drain the crankcase after the engine has reached normal operating temperature. The benefit of draining is, to a large extent, lost if the crankcase is drained when the engine is cold, as some of the foreign material will cling to the sides of the oil pan and will not drain out readily with slower moving oil.

Crankcase Ventilator. The crankcase in all modern engines is provided with a ventilating system to prevent harmful dilution of the engine oil by water and fuel under normal driving conditions. This system utilizes the crankshaft with its counter-weights as a blower to force the vapors, consisting of fuel and water, from the crankcase.

Chassis Lubrication. The lubrication chart supplied by the manufacturer indicates the points requiring lubrication, the recommended intervals, and the kind of lubricant to be used. It should be realized that oily surfaces quickly collect dirt, which, if they reach the various working parts, will cause premature wear. It is advisable, therefore, to keep all points of lubrication as free as possible from dirt and to clean the fittings before the lubricant is applied.

In addition to the regular chassis lubrication every 1000 miles, as recommended by most manufacturers, the following units should be lubricated at specified intervals (based on lubrication of a good 1940 commercial model):

a. Transmission. Remove the filler cap in the transmission case and fill to the level of the opening with oil conforming in viscosity with S.A.E. No. 160 (S.A.E. 160 E. P., S.A.E. 140 or S.A.E. 140 E. P. can also be used) for summer and S.A.E. No. 80 (S.A.E. 80 E. P. can also be used) for winter use. Check the level of the oil frequently.

Do not fail to change from summer grade of lubricant to the winter type when cold weather approaches. Failure to change the lubricant may result in hard shifting and a noisy transmission.

b. Rear axle lubrication. The rear axle is equipped with a spiral level gear and pinion. It must be lubricated with S.A.E. No. 90 HYPOID GEAR LUBRICANT.

The rear axle should be drained, flushed and refilled with 2½ pounds of fresh HYPOID lubricant in the spring and fall of the year. In addition to the seasonal changes, the rear axle should be drained every 10,000 miles if the car is used in service where high mileage is obtained under high driving conditions. Under normal circumstances, no lubricant need be added between these draining periods, but the lubricant level should be checked every 2000 miles as a safety measure.

In localities where the temperature does not fall below minus 10° F, S.A.E. No. 90 HYPOID LUBRICANT is recommended for use both in winter and summer. S.A.E. No. 80 HYPOID is recommended for use during the winter months in localities where the temperature drops below minus 10° F.

It is extremely important that only HYPOID lubricants having the properties and characteristics necessary for the satisfactory lubrication of hypoid gears be used in the rear axle. Hypoid gears require a special lubricant and great care must be taken to follow the manufacturer's recommendations.

c. Steering gear. Remove the plug in the steering gear housing and replenish, if necessary, with chassis lubricant every 5000 miles. Do not drain, as this unit is filled with an all-season lubricant at the factory.

d. Universal joint lubrication. The needle bearings at the transmission and the rear axle end of the propeller shafts and the ball bearing at the center connection of the propeller shaft are pre-packed with lubricant at the time of their manufacture; therefore, no attention need be given these bearings so far as lubrication is concerned.

However, it is necessary that lubricant be applied to the slip joint of the propeller shaft at the rear axle end every 1000 miles. Lubricant is applied by means of a high pressure lubrication fitting in the propeller shaft.

MAINTENANCE

Preventive Maintenance. The purpose of any motor vehicle is to carry a given load, over a certain distance, reliably and efficiently. It represents a large investment and should be treated accordingly. The question, "How long will a truck last?" cannot be answered, except by "That depends, to a considerable extent, upon the quality of the vehicle, its adaptability to the job, the work it is called upon to perform, *and the way in which it is operated and maintained.*"

Performance and economy of operation alone do not suffice to give efficient transportation, for such operation must not be interrupted and the equipment must be ready for service at all times. A system of preventive maintenance will do much to eliminate mechanical road delays; it will reduce maintenance costs-per-mile, and accidents.

SERVICE	"A" Service 1000 Miles	"B" Service 5000 Miles	"C" Service 15,000 Miles	"D" Service 30,000 Miles
A Each 1,000 Miles	Every 1000 miles throughout life of the vehicle. Includes as principal operations general tightening and 1. Entire chassis lubricated. 2. Plugs cleaned and spaced. 3. Ignition timing checked. 4. Valves adjusted. 5. Carburetor adjusted.			
B Each 5,000 Miles	All "A" service items included.	Includes as principal operations: 1. Wheel alignment checked. 2. Wheels removed, grease retainers and bearings checked. 3. Brakes adjusted. 4. Axle U bolts tightened. 5. Crankcase ventilator cleaned. 6. Generator checked and adjusted.		
C Each 15,000 Miles	All "A" service items included.	All "B" service items included.	Major items checked includes as principal operations: 1. Cooling system thoroughly cleaned. 2. Valves reconditioned and springs replaced. 3. Fuel pump overhauled or exchanged. 4. Water pump repacked. 5. Distributor points, condenser and high tension wires replaced.	
D Each 30,000 Miles	All "A" service items included.	All "B" service items included.	All "C" service items included.	All major units inspected. 1. Transmission and differential removed, cleaned, inspected and adjusted. 2. Wheel bearings washed and inspected. 3. Spindle bolts, bushings, and tie rod ends replaced. 4. Clutch disassembled, discs, lining, etc., replaced. 5. Universal joints and center bearings overhauled. 6. Brakes relined and mechanism overhauled. 7. Pistons and rods removed.—Bearings and cylinder walls checked, valves ground and parts replaced where necessary.

Plate 49. Preventive Maintenance System (An Outline).

"E" Service—generally performed at 60,000 miles—a thorough reconditioning of all major units is performed, including a factory re-manufactured engine or complete engine overhaul. Through a careful study of operating conditions, fleet operators may frequently lengthen the time between these service operations.

Repairing is the last resort of maintenance. The maintenance efficiency of a fleet is inversely proportional to the amount of repairing required. True, there comes a time when repairing is inevitable; but the maximum effort should be concentrated in postponing this time to the very farthest possible date. In other words, the aim and objective of maintenance primarily should be to prevent repairs—"PREVENTIVE MAINTENANCE."

After long study and experience, one of the largest truck and bus manufacturers, for example, reduces the important features of maintenance to five services or operations, progressing from minor inspections and lubrication, as in service A, (See Plate 49), to repairs and rebuilding as in service E.

Military Motor Vehicle Maintenance. In the Army system of maintenance, the three

elements—personnel, equipment and supplies—have stratified or echeloned the maintenance work. The basic principles of the Army system are:

a. Unit replacement, in which units are replaced in the lower and rebuilt by the higher echelons of maintenance.

COMBAT VEHICLES*	
SUSPENSION (For full track and rear end of half-track vehicles)	ADDITIONAL RACKS
141. Arm bogie	154. Wear bogie link
142. Bearing bogie arm	155. Wear bogie link
143. Final drive, lub'n	156. Wear, guidepin
144. Final drive, sprocket	157. Wear, guidepin
145. Leaks, wheel bearing	158. Wheel bogie (to be lined)
146. Leaks, wheel bearing	159. Wheel bogie
147. Leaks, suspension	160. Wheel bogie
148. Shock absorber	161. Shock absorber
149. Tire, bogie	162. Tire, bogie
150. Track, adjustment	163. Tire, bogie
151. Track, roller component	164. Tire, bogie
152. Tire, bogie	165. Tire, bogie
TURRET	
166. Turret, bogie	167. Turret, bogie
168. Turret, bogie	168. Turret, bogie
169. Turret, bogie	169. Turret, bogie
170. Turret, bogie	170. Turret, bogie
171. Turret, bogie	171. Turret, bogie
172. Turret, bogie	172. Turret, bogie
173. Turret, bogie	173. Turret, bogie
174. Turret, bogie	174. Turret, bogie
175. Turret, bogie	175. Turret, bogie
REPAIRS REQUIRED (EXPLANATION)	
REMARKS AND RECOMMENDATIONS:	

Inspector,
120--7, Belvoir, Va.—14-30-300-000

Supervising Officer

TECHNICAL INSPECTION REPORT OF MOTOR VEHICLES	
Vehicle Number/Date	Date
U.S.A. Registration No.	Mileage
Organization	Station
Supply Arm or Service Maintaining Vehicle	Check 'V' is satisfactory. X = no pair or replacement needed.
EXTERNAL INSPECTION	
HOIST VEHICLE (If practicable)	
(Except full track & rear end of half-track vehicles)	
1. Bumpers	94. Starting motor
2. Body, running	95. Switch, ignition
3. Body, front	96. Switch, mech. starter
4. Axle, front	97. Switch, sol. starter
5. Axle, rear	98. Switch, sol. starter
6. Axle, rear	99. Switch, sol. starter
7. Axle, rear	100. Switch, sol. starter
8. Axle, rear	101. Tools
9. Axle, rear	102. Throttle
10. Axle, rear	103. Upshifters
11. Axle, rear	104. Wiper, windshield
12. Axle, rear	105. Wiper, windshield
13. Axle, rear	106. Wiper, windshield
14. Axle, rear	107. Wiper, windshield
15. Axle, rear	108. Wiper, windshield
16. Axle, rear	109. Wiper, windshield
17. Axle, rear	110. Wiper, windshield
18. Axle, rear	111. Wiper, windshield
19. Axle, rear	112. Wiper, windshield
20. Axle, rear	113. Wiper, windshield
21. Axle, rear	114. Wiper, windshield
22. Axle, rear	115. Wiper, windshield
23. Axle, rear	116. Wiper, windshield
24. Axle, rear	117. Wiper, windshield
25. Axle, rear	118. Wiper, windshield
26. Axle, rear	119. Wiper, windshield
27. Axle, rear	120. Wiper, windshield
28. Axle, rear	121. Wiper, windshield
29. Axle, rear	122. Wiper, windshield
30. Axle, rear	123. Wiper, windshield
31. Axle, rear	124. Wiper, windshield
32. Axle, rear	125. Wiper, windshield
33. Axle, rear	126. Wiper, windshield
34. Axle, rear	127. Wiper, windshield
35. Axle, rear	128. Wiper, windshield
36. Axle, rear	129. Wiper, windshield
37. Axle, rear	130. Wiper, windshield
38. Axle, rear	131. Wiper, windshield
39. Axle, rear	132. Wiper, windshield
40. Axle, rear	133. Wiper, windshield
41. Axle, rear	134. Wiper, windshield
42. Axle, rear	135. Wiper, windshield
43. Axle, rear	136. Wiper, windshield
44. Axle, rear	137. Wiper, windshield
45. Axle, rear	138. Wiper, windshield
46. Axle, rear	139. Wiper, windshield
47. Axle, rear	140. Wiper, windshield
48. Axle, rear	141. Wiper, windshield
49. Axle, rear	142. Wiper, windshield
50. Axle, rear	143. Wiper, windshield
51. Axle, rear	144. Wiper, windshield
52. Axle, rear	145. Wiper, windshield
53. Axle, rear	146. Wiper, windshield
54. Axle, rear	147. Wiper, windshield
55. Axle, rear	148. Wiper, windshield
56. Axle, rear	149. Wiper, windshield
57. Axle, rear	150. Wiper, windshield
58. Axle, rear	151. Wiper, windshield
59. Axle, rear	152. Wiper, windshield
60. Axle, rear	153. Wiper, windshield
61. Axle, rear	154. Wiper, windshield
62. Axle, rear	155. Wiper, windshield
63. Axle, rear	156. Wiper, windshield
64. Axle, rear	157. Wiper, windshield
65. Axle, rear	158. Wiper, windshield
66. Axle, rear	159. Wiper, windshield
67. Axle, rear	160. Wiper, windshield
68. Axle, rear	161. Wiper, windshield
69. Axle, rear	162. Wiper, windshield
70. Axle, rear	163. Wiper, windshield
71. Axle, rear	164. Wiper, windshield
72. Axle, rear	165. Wiper, windshield
73. Axle, rear	166. Wiper, windshield
74. Axle, rear	167. Wiper, windshield
75. Axle, rear	168. Wiper, windshield
76. Axle, rear	169. Wiper, windshield
77. Axle, rear	170. Wiper, windshield
78. Axle, rear	171. Wiper, windshield
79. Axle, rear	172. Wiper, windshield
80. Axle, rear	173. Wiper, windshield
81. Axle, rear	174. Wiper, windshield
82. Axle, rear	175. Wiper, windshield
83. Axle, rear	176. Wiper, windshield
84. Axle, rear	177. Wiper, windshield
85. Axle, rear	178. Wiper, windshield
86. Axle, rear	179. Wiper, windshield
87. Axle, rear	180. Wiper, windshield
88. Axle, rear	181. Wiper, windshield
89. Axle, rear	182. Wiper, windshield
90. Axle, rear	183. Wiper, windshield
91. Axle, rear	184. Wiper, windshield
92. Axle, rear	185. Wiper, windshield
93. Axle, rear	186. Wiper, windshield
94. Axle, rear	187. Wiper, windshield
95. Axle, rear	188. Wiper, windshield
96. Axle, rear	189. Wiper, windshield
97. Axle, rear	190. Wiper, windshield
98. Axle, rear	191. Wiper, windshield
99. Axle, rear	192. Wiper, windshield
100. Axle, rear	193. Wiper, windshield
101. Axle, rear	194. Wiper, windshield
102. Axle, rear	195. Wiper, windshield
103. Axle, rear	196. Wiper, windshield
104. Axle, rear	197. Wiper, windshield
105. Axle, rear	198. Wiper, windshield
106. Axle, rear	199. Wiper, windshield
107. Axle, rear	200. Wiper, windshield
108. Axle, rear	201. Wiper, windshield
109. Axle, rear	202. Wiper, windshield
110. Axle, rear	203. Wiper, windshield
111. Axle, rear	204. Wiper, windshield
112. Axle, rear	205. Wiper, windshield
113. Axle, rear	206. Wiper, windshield
114. Axle, rear	207. Wiper, windshield
115. Axle, rear	208. Wiper, windshield
116. Axle, rear	209. Wiper, windshield
117. Axle, rear	210. Wiper, windshield
118. Axle, rear	211. Wiper, windshield
119. Axle, rear	212. Wiper, windshield
120. Axle, rear	213. Wiper, windshield
121. Axle, rear	214. Wiper, windshield
122. Axle, rear	215. Wiper, windshield
123. Axle, rear	216. Wiper, windshield
124. Axle, rear	217. Wiper, windshield
125. Axle, rear	218. Wiper, windshield
126. Axle, rear	219. Wiper, windshield
127. Axle, rear	220. Wiper, windshield
128. Axle, rear	221. Wiper, windshield
129. Axle, rear	222. Wiper, windshield
130. Axle, rear	223. Wiper, windshield
131. Axle, rear	224. Wiper, windshield
132. Axle, rear	225. Wiper, windshield
133. Axle, rear	226. Wiper, windshield
134. Axle, rear	227. Wiper, windshield
135. Axle, rear	228. Wiper, windshield
136. Axle, rear	229. Wiper, windshield
137. Axle, rear	230. Wiper, windshield
138. Axle, rear	231. Wiper, windshield
139. Axle, rear	232. Wiper, windshield
140. Axle, rear	233. Wiper, windshield
141. Axle, rear	234. Wiper, windshield
142. Axle, rear	235. Wiper, windshield
143. Axle, rear	236. Wiper, windshield
144. Axle, rear	237. Wiper, windshield
145. Axle, rear	238. Wiper, windshield
146. Axle, rear	239. Wiper, windshield
147. Axle, rear	240. Wiper, windshield
148. Axle, rear	241. Wiper, windshield
149. Axle, rear	242. Wiper, windshield
150. Axle, rear	243. Wiper, windshield
151. Axle, rear	244. Wiper, windshield
152. Axle, rear	245. Wiper, windshield
153. Axle, rear	246. Wiper, windshield
154. Axle, rear	247. Wiper, windshield
155. Axle, rear	248. Wiper, windshield
156. Axle, rear	249. Wiper, windshield
157. Axle, rear	250. Wiper, windshield
158. Axle, rear	251. Wiper, windshield
159. Axle, rear	252. Wiper, windshield
160. Axle, rear	253. Wiper, windshield
161. Axle, rear	254. Wiper, windshield
162. Axle, rear	255. Wiper, windshield
163. Axle, rear	256. Wiper, windshield
164. Axle, rear	257. Wiper, windshield
165. Axle, rear	258. Wiper, windshield
166. Axle, rear	259. Wiper, windshield
167. Axle, rear	260. Wiper, windshield
168. Axle, rear	261. Wiper, windshield
169. Axle, rear	262. Wiper, windshield
170. Axle, rear	263. Wiper, windshield
171. Axle, rear	264. Wiper, windshield
172. Axle, rear	265. Wiper, windshield
173. Axle, rear	266. Wiper, windshield
174. Axle, rear	267. Wiper, windshield
175. Axle, rear	268. Wiper, windshield
176. Axle, rear	269. Wiper, windshield
177. Axle, rear	270. Wiper, windshield
178. Axle, rear	271. Wiper, windshield
179. Axle, rear	272. Wiper, windshield
180. Axle, rear	273. Wiper, windshield
181. Axle, rear	274. Wiper, windshield
182. Axle, rear	275. Wiper, windshield
183. Axle, rear	276. Wiper, windshield
184. Axle, rear	277. Wiper, windshield
185. Axle, rear	278. Wiper, windshield
186. Axle, rear	279. Wiper, windshield
187. Axle, rear	280. Wiper, windshield
188. Axle, rear	281. Wiper, windshield
189. Axle, rear	282. Wiper, windshield
190. Axle, rear	283. Wiper, windshield
191. Axle, rear	284. Wiper, windshield
192. Axle, rear	285. Wiper, windshield
193. Axle, rear	286. Wiper, windshield
194. Axle, rear	287. Wiper, windshield
195. Axle, rear	288. Wiper, windshield
196. Axle, rear	289. Wiper, windshield
197. Axle, rear	290. Wiper, windshield
198. Axle, rear	291. Wiper, windshield
199. Axle, rear	292. Wiper, windshield
200. Axle, rear	293. Wiper, windshield
201. Axle, rear	294. Wiper, windshield
202. Axle, rear	295. Wiper, windshield
203. Axle, rear	296. Wiper, windshield
204. Axle, rear	297. Wiper, windshield
205. Axle, rear	298. Wiper, windshield
206. Axle, rear	299. Wiper, windshield
207. Axle, rear	300. Wiper, windshield
208. Axle, rear	301. Wiper, windshield
209. Axle, rear	302. Wiper, windshield
210. Axle, rear	303. Wiper, windshield
211. Axle, rear	304. Wiper, windshield
212. Axle, rear	305. Wiper, windshield
213. Axle, rear	306. Wiper, windshield
214. Axle, rear	307. Wiper, windshield
215. Axle, rear	308. Wiper, windshield
216. Axle, rear	309. Wiper, windshield
217. Axle, rear	310. Wiper, windshield
218. Axle, rear	311. Wiper, windshield
219. Axle, rear	312. Wiper, windshield
220. Axle, rear	313. Wiper, windshield
221. Axle, rear	314. Wiper, windshield
222. Axle, rear	315. Wiper, windshield
223. Axle, rear	316. Wiper, windshield
224. Axle, rear	317. Wiper, windshield
225. Axle, rear	318. Wiper, windshield
226. Axle, rear	319. Wiper, windshield
227. Axle, rear	320. Wiper, windshield
228. Axle, rear	321. Wiper, windshield
229. Axle, rear	322. Wiper, windshield
230. Axle, rear	323. Wiper, windshield
231. Axle, rear	324. Wiper, windshield
232. Axle, rear	325. Wiper, windshield
233. Axle, rear	326. Wiper, windshield
234. Axle, rear	327. Wiper, windshield
235. Axle, rear	328. Wiper, windshield
236. Axle, rear	329. Wiper, windshield
237. Axle, rear	330. Wiper, windshield
238. Axle, rear	331. Wiper, windshield
239. Axle, rear	332. Wiper, windshield
240. Axle, rear	333. Wiper, windshield
241. Axle, rear	334. Wiper, windshield
242. Axle, rear	335. Wiper, windshield
243. Axle, rear	336. Wiper, windshield
244. Axle, rear	337. Wiper, windshield
245. Axle, rear	338. Wiper, windshield
246. Axle, rear	339. Wiper, windshield
247. Axle, rear	340. Wiper, windshield
248. Axle, rear	341. Wiper, windshield
249. Axle, rear	342. Wiper, windshield
250. Axle, rear	343. Wiper, windshield
251. Axle, rear	344. Wiper, windshield
252. Axle, rear	345. Wiper, windshield
253. Axle, rear	346. Wiper, windshield
254. Axle, rear	347. Wiper, windshield
255. Axle, rear	348. Wiper, windshield
256. Axle, rear	349. Wiper, windshield
257. Axle, rear	350. Wiper, windshield
258. Axle, rear	351. Wiper, windshield
259. Axle, rear	352. Wiper, windshield
260. Axle, rear	353. Wiper, windshield
261. Axle, rear	354. Wiper, windshield
262. Axle, rear	355. Wiper, windshield
263. Axle, rear	356. Wiper, windshield
264. Axle, rear	357. Wiper, windshield
265. Axle, rear	358. Wiper, windshield
266. Axle, rear	359. Wiper, windshield
267. Axle, rear	360. Wiper, windshield
268. Axle, rear	361. Wiper, windshield
269. Axle, rear	362. Wiper, windshield
270. Axle, rear	363. Wiper, windshield
271. Axle, rear	364. Wiper, windshield
272. Axle, rear	365. Wiper, windshield
273. Axle, rear	366. Wiper, windshield
274. Axle, rear	367. Wiper, windshield
275. Axle, rear	368. Wiper, windshield
276. Axle, rear	369. Wiper, windshield
277. Axle, rear	370. Wiper, windshield
278. Axle, rear	371. Wiper, windshield
279. Axle, rear	372. Wiper, windshield
280. Axle, rear	373. Wiper, windshield
281. Axle, rear	374. Wiper, windshield
282. Axle, rear	375. Wiper, windshield
283. Axle, rear	376. Wiper, windshield
284. Axle, rear	377. Wiper, windshield
285. Axle, rear	378. Wiper, windshield
286. Axle, rear	379. Wiper, windshield
287. Axle, rear	380. Wiper, windshield
288. Axle, rear	381. Wiper, windshield
289. Axle, rear	382. Wiper, windshield
290. Axle, rear	383. Wiper, windshield
291. Axle, rear	384. Wiper, windshield
292. Axle, rear	385. Wiper, windshield
293. Axle, rear	386. Wiper, windshield
294. Axle, rear	387. Wiper, windshield
295. Axle, rear	388. Wiper, windshield
296. Axle, rear	389. Wiper, windshield
297. Axle, rear	390. Wiper, windshield
298. Axle, rear	391. Wiper, windshield
299. Axle, rear	392. Wiper, windshield
300. Axle, rear	393. Wiper, windshield
301. Axle, rear	394. Wiper, windshield
302. Axle, rear	395. Wiper, windshield
303. Axle, rear	396. Wiper, windshield
304. Axle, rear	397. Wiper, windshield
305. Axle, rear	398. Wiper, windshield
306. Axle, rear	399. Wiper, windshield
307. Axle, rear	400. Wiper, windshield
308. Axle, rear	401. Wiper, windshield
309. Axle, rear	402. Wiper, windshield
310. Axle, rear	403. Wiper, windshield
311. Axle, rear	404. Wiper, windshield
312. Axle, rear	405. Wiper, windshield
313. Axle, rear	406. Wiper, windshield
314. Axle, rear	407. Wiper, windshield
315. Axle, rear	408. Wiper, windshield

The second echelon—preventive maintenance, minor repairs and replacement of smaller units as carburetors, fuel pumps and generators.

The third echelon—unit replacement beyond the scope of the second and repairs involving the use of medium mobile shop equipment and the services of general mechanics and a limited number of automotive trade specialists.

The fourth echelon—general overhaul and reclamation of units and vehicles.

d. Inspections are made to detect deficiencies in the mechanical condition, appearance, servicing, and operation of motor vehicles, and to recommend corrective measures.

Responsibility for First and Second Echelon Maintenance. The work of the first two echelons is normally performed by the personnel, of or attached to, the organization to which the vehicle is assigned. That of the last two echelons is normally performed by service (Quartermaster and Ordnance) personnel. This text is primarily concerned with the work of the first two echelons—the driver and his company.

Preventive maintenance of the first and second echelons includes inspection, lubrication, cleaning, adjusting and servicing of motor vehicles and prevention of abuse. Efficient enforcement of preventive maintenance is the responsibility of commanding officers of all units operating motor vehicles. In carrying out this function definite maintenance duties are assigned to the motor vehicle operator and he also is prohibited from performing any maintenance function not specifically assigned.

Servicing a motor vehicle includes the checking and necessary replenishment of gasoline, oil in the crankcase, water in the cooling system and air in the tires.

Inspections. Inspections are classified as *routine* and *technical*. In order to insure definite thoroughness, in all details, forms are issued and required to be submitted for each inspection.

a. *Routine inspections.* Routine inspections of motor vehicles begin with the motor vehicle operator and are the responsibility of all echelons of command. The inspections of the motor vehicle operator include those made before, during, and after each operation of the vehicle. The operator observes and reports to the next in command on deficiencies noted in the condition or performance of his vehicle. (See Driver's Daily Operation and Inspection Report). Motor vehicles in operation are also inspected daily by section chiefs, who are responsible that the vehicle operator's functions of preventive maintenance are carried out. It is an important duty of successive commanders throughout the echelons of command to make periodic inspections of the military motor vehicles of their command.

b. *Technical inspections.* Technical inspections include a complete and detailed inspection and adjustment, when necessary and practical, of all units of the motor vehicle. War Department, *QMC Form No. 260* is used. In the second echelon this inspection is a preventive maintenance function, the object of which is to insure that vehicles in operation are at all times properly lubricated, adjusted, and in satisfactory operating condition. All vehicles except track vehicles are given this inspection by personnel of operating organizations not less than once each month, or after each 1000 miles of operation, whenever a vehicle is run more than that distance in a single month. Track vehicles are inspected as prescribed in the *Ordnance Handbooks*.

The third echelon technical inspection is a follow-up and check on the second echelon inspection and other maintenance functions and determines whether the vehicle should be continued in service or withdrawn from operation for overhaul. It is made once every three months or after 3000 miles of operation whenever a vehicle is run more than 3000 miles in a single three months' period.

Mechanical Inspection Report. The Mechanical Inspection Report (*QMC Form No. 246*) has been in use in the Army for a great many years. Its use will be modified and limited by the new *QMC Form No. 260*. Form No. 246 is accomplished as a record of all field and depot periodic inspections when vehicles are sent to Maintenance Shops for repair, overhaul or rebuild, or when vehicles are damaged in collision or otherwise made unserviceable through misuse.

TRAINING DRIVERS AND MOTOR VEHICLE OPERATION

General. In a sense, the automobile comes from the factory an unfinished mechanism. It lacks the most important part—the driver. Sixty-five per cent of automobile fatalities—some 20,000 annual deaths, not to mention most of the damage to vehicles—are caused

by the drivers' mistakes: driving too fast for conditions, driving on the wrong side of the road, delayed braking, cutting in, improper parking, failure to signal, reckless and drunken driving.

Selection and Training of Drivers. *a.* Some fourteen per cent of the drivers cause fifty-eight per cent of the accidents—the "accident prone" class. One trucking company adopted a policy of discharging drivers who were found to be repeaters (always having some sort of an accident). Five per cent of its drivers were discharged on this account and the company's accidents were reduced thirty per cent.

Several large commercial organizations weed out most of the "accident prone" driver applicants by requiring them to pass the following tests:

- (1) *Depth perception.* Judgment of distance.
- (2) *Tunnel vision.* How wide a panorama is envisioned when looking straight ahead.
- (3) *Visual acuity.* Keenness of vision or how well the subject sees what he looks at.
- (4) *Color blindness.* Drivers must have a clear perception of red, green, and amber.
- (5) *Glare blindness.* Ability to see when faced by the headlights of an oncoming vehicle.
- (6) *Movement sensitivity.* Quickness of perception of change of movement.
- (7) *Reaction time.* Time to act after the necessity for action is perceived.

Good driving practices are formed by doing the right thing so often that doing it right becomes so strong a habit that you cannot do it wrong. The more knowledge that the reasonably intelligent driver has concerning the actual operation of a motor vehicle and its parts, the more skillful should be his manipulation of that vehicle. A course of instruction of about one month is necessary to qualify drivers. It should include: instruction in traffic laws, military regulations for the operation of vehicles, lubrication, and a great deal of actual driving under the supervision of competent instructors.

WAR DEPARTMENT—Q. M. C. Form 228 (Old No. 531)—Approved April 17, 1928	
UNITED STATES ARMY MOTOR VEHICLE	
DATE _____	OPERATOR'S PERMIT No. _____
QUARTERMASTER CORPS, TRANSPORTATION SERVICE MOTOR TRANSPORT DIVISION	
THIS PERMIT, WHEN OFFICIALLY STAMPED AND DATED, AUTHORIZES THE UNDERSIGNED TO OPERATE U. S. A. No. _____ OR ANY MOTOR VEHICLE IN THE ARMY.	
_____ SIGNATURE OF ISSUING OFFICER	_____ SIGNATURE OF OPERATOR
_____ STATION	_____ ORGANIZATION
Any violation of Motor Transport regulations or conviction by any court will be entered on reverse side of this card.	
3-8552	U. S. GOVERNMENT PRINTING OFFICE

Plate 51.

b. Before a motor vehicle operator's permit (*W.D. QMC Form 228*) can be issued to a driver, who should be an average-sized man of good physique, making him eligible to operate military motor vehicles, he must satisfactorily pass an examination, conducted by a commissioned officer, covering the following subjects:

- (1) *Mechanical.* Nomenclature and functions of major units of the motor vehicle.
- (2) *Operation.* (a) Actual driving of the vehicle, involving the use of the controls, reversing, and parking under usual conditions of traffic and terrain.
(b) Traffic regulations, road procedure, safety precautions, speed limits, and vehicle abuse.
- (3) *Maintenance.* First echelon (vehicle operator's) maintenance.

Common Abuses. Intelligent care of a motor vehicle includes what the driver does and does not do when behind the wheel as well as the regular servicing. In fact much less service will be needed if the driver at the wheel is a master of the art of driving. The good driver instinctively avoids the common abuses, which are:

- a. Failure to depress the clutch pedal when using the starter.
- b. Racing the engine while it is cold.
- c. Excessive use of the manually operated choke.
- d. Charging the traffic lights and sliding the wheels to a stop, followed by a flashy get-away.
- e. Releasing the clutch pedal suddenly and starting the vehicle with a jerk.
- f. Pulling a hill in high gear and allowing the engine to labor.
- g. Failure to check the battery at least once a month—and other units and parts that must be periodically inspected, serviced, and adjusted.
- h. Putting off changing the engine oil or lubricating the chassis for a few hundred more miles—then using the wrong grade of grease or oil.
- i. Overloading or improper loading.
- j. Pushing the vehicle a little too hard over rough roads or across country.
- k. Accidents!

Safety Precautions.

- a. *Road procedure.*

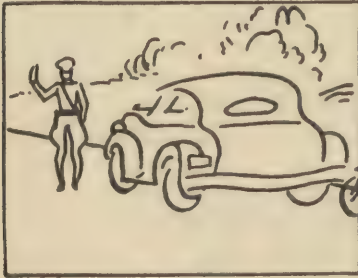


Plate 52.

Never disobey military or civil police on duty, nor local or state highway regulations.

Never pass a vehicle going around a corner or blind curve.

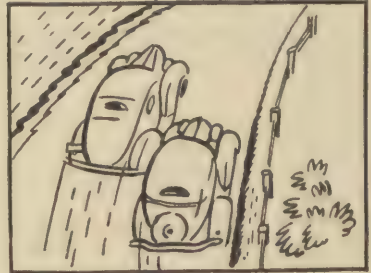


Plate 53.

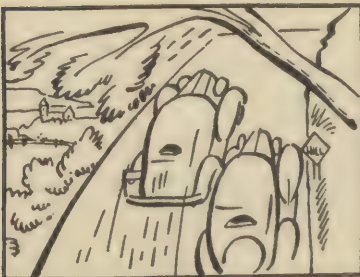


Plate 54.

Never pass a vehicle in ascending or descending a hill unless safe passage is assured.

Never pass a vehicle at a street intersection or crossroad.

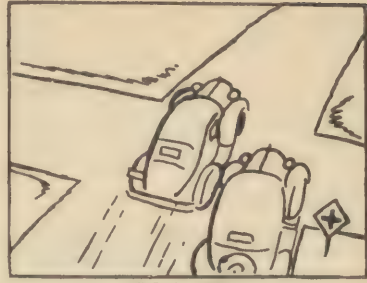


Plate 55.

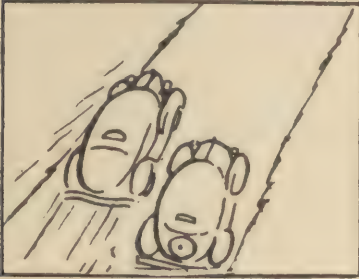


Plate 56.

Never cross a railroad crossing not guarded by military personnel or civilian watchman before bringing the vehicle to a complete halt.

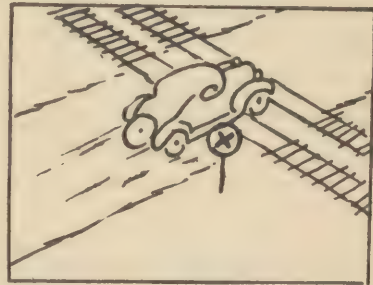


Plate 57.

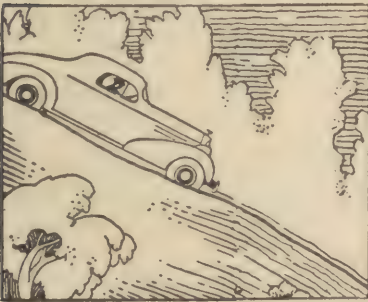


Plate 58.

Never under any condition disengage the clutch or put the gear shift lever in neutral and coast down hills.

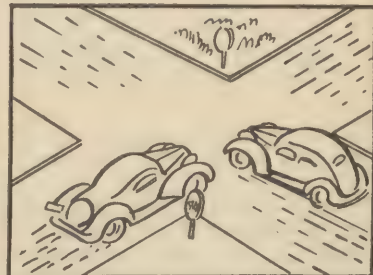


Plate 59.

Slow down to a safe stopping speed at all road intersections not covered by traffic control personnel or traffic control devices.

MILITARY MEDICAL MANUAL

b. Precautions against fire. Never work on a gasoline tank or a fuel system in the presence of a flame—use a protected electric light.

Never operate a motor vehicle without an approved type of fire extinguisher.

Never use water to extinguish a gasoline or oil fire—use carbon tetrachloride foam, or carbon dioxide gas extinguishers, or sand.

WAR. DEPARTMENT Q. M. C. Form 237 (old 545) Revised July 17, 1925		FRONT	SPEEDOMETER READING	
DRIVER'S TRIP TICKET AND PERFORMANCE RECORD QUARTERMASTER CORPS. TRANSPORTATION DIVISION			IN <u>2110</u>	
			OUT <u>2100</u>	
DRIVER'S NAME <u>Pvt. Jones</u>	U. S. A. REGISTRATION NO. <u>W-31106</u>	DISPATCHER'S NAME <u>Corp. Brown</u>	TOTAL <u>10 miles</u>	
			TIME IN <u>11:00</u>	
			TIME OUT <u>8:00 AM</u>	
REPORT TO <u>Supply Officer</u>		DEPT. OR ADDRESS <u>29th Inf.</u>		
DATE <u>5-28-39</u>		TIME <u>8:15 AM</u> ESTIMATED TIME FOR JOB <u>3</u> HOURS		
TYPE AND CAPACITY VEHICLE DESIRED <u>1 1/2 Ton</u>		PICK-UP TON		
CARGO DESCRIPTION <u>General Supplies</u>		WEIGHT <u>2000</u>		POUNDS TONS
HAUL FROM <u>Warehouse 10</u>		TO <u>Store Room</u>		
TRANSPORTATION REQUESTED BY <u>Adjutant</u>				
I CERTIFY THAT THIS VEHICLE WAS USED FOR OFFICIAL BUSINESS.		(SIGNATURE) <u>Ralph Smith.</u>		
WAS THERE AN ACCIDENT? <u>No</u> YES. NO.		(RANK) <u>Capt. 29th Inf.</u>		
SIGNATURE OF DRIVER <u>Pvt. Jones</u>		DATE <u>5-28-39</u>		

U. S. GOVERNMENT PRINTING OFFICE: 1925 3-0495

BACK

PERFORMANCE RECORD

	PASS. TONS	MILES		PASS. TONS	MILES
FROM Warehouse No. 10	1/2	2 1/2	TO		
Store Room		2 1/2	TO		
Ware House No. 10	1/2	2 1/2	TO		
Store Room		2 1/2	TO		
TO			TO		
TO			TO		
TO			TO		
TO			TO		
TO			TO		
TO			TO		
TO			TO		
TO			TO		
TOTAL,				1	10

5-5455

Plate 60.

Never leave a shop at closing time without removing all pans containing oil, gasoline or other inflammable material and the can containing greasy and oily rags and other waste—put them in an open space where there is no fire hazard.

Never fail to make frequent inspections of fire equipment to determine its serviceability and to see that it meets the requirements of Army and local regulations.

PAGE 4

17. Was an investigation made by a policeman (civil or military)? Yes If so, state

Name Sgt. Wm. Price No. 16

precinct or station Phoenix City

18. Names and addresses of persons other than driver in Government car:

Sgt. Harry Goss

19. Names and addresses of other witnesses:

None

Pvt. Harry Jones
(Signature of driver)

I certify that the above report was delivered to me on the _____ day of _____, 19____, at _____ o'clock _____.

(Signature of officer in charge)

(Official title)

(Government department or establishment)

NOTE.—This report should be attached to report of Investigating Officer.

10—1810

U. S. GOVERNMENT PRINTING OFFICE: 1927

PAGE 1

Standard Form No. 28
Approved by the President
June 10, 1927

DRIVER'S REPORT—ACCIDENT

MOTOR TRANSPORTATION

INSTRUCTIONS TO DRIVERS

In case of injury to person or damage to property:

A. Stop car and render such assistance as may be needed.

B. Fill out this form, ON THE SPOT, so far as possible.

C. Deliver this report promptly to your immediate superior.

Failure to observe these instructions will result in disciplinary action.

1. Name of Government driver:

Pvt. Harry Jones

2. Stationed at Fort Benning, Ga.

3. Make and type of Government vehicle Chevrolet

1 1/2 Ton Truck

4. Service number W-31106

5. Name and address of owner of other vehicle (or owner of property damaged) Mr. James Brown
419 10th Ave., Columbus, Ga.

6. Name and address of driver of other vehicle

Same as listed under par. 5

7. License of other vehicle: State Alabama

No. 311-610

8. Place of accident: City Phoenix City

Street 14th St.

10—1810

PAGE 2

9. Date of accident May 10, 1939 Hour 4 P.M.

10. Names and addresses of persons injured; nature of injuries:

Mr. James Brown

419 10th Ave.

Columbus, Ga. - Broken Arm

11. Describe damage to Government vehicle Rear Left

Fender Crushed - Tail Light +

Bracket Broken Off

12. Describe damage to privately owned vehicle, or other property:

Bumper, R. Fender + R. Head-

light torn off. R. Wheel +

Tire Damaged. (1937 Chev. Sedan)

PAGE 3

13. What signal was given by each driver prior to accident?

Driver Army Vehicle put
Left Hand Out Indicating Stop

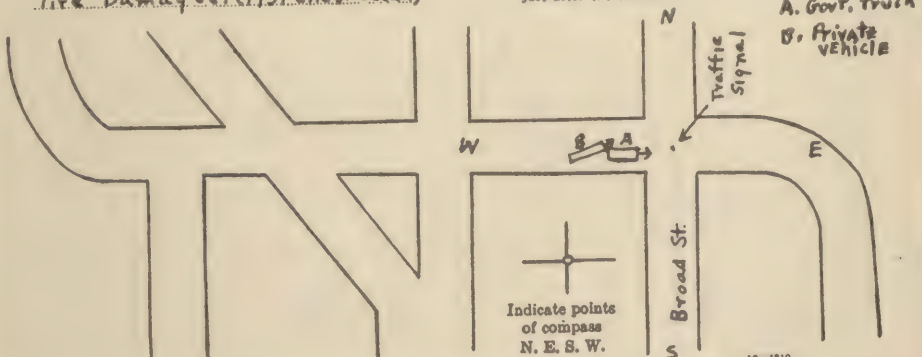
14. State condition of light, weather, and roadway:

Light - Good, Weather - Clear,
Roadway - cement

15. Explain how accident happened:

Govt. Truck in
Convay stopped at Traffic Light
Civ. Car hit rear of Gov.
Truck

16. Label streets and indicate measurements; show the position of each vehicle at the time of the accident and show by dotted lines the course of each vehicle just before and just after the collision.



10—1810

FRONT

INVESTIGATING OFFICER'S REPORT—ACCIDENT
MOTOR TRANSPORTATION

Standard Form No. 107
Approved by the War Department
June 14, 1937

This report, together with the driver's report (Form No. 26), must be submitted promptly in accordance with department regulations.

1. Date _____ 19 _____ Hour _____ M.

2. Place: City or town _____ State _____

3. Street _____

4. Weather _____ Condition of roadway _____

5. Make and type of vehicle _____ Service No. _____

6. Name of driver _____

7. His title and station _____

8. Make and type of vehicle _____ License No. _____

9. Owner: Name _____

10. Address _____

11. Driver: Name _____

12. Address _____

13. License No. _____

14. Names and addresses and extent of injuries _____

15. If medical aid was rendered, state by whom _____

16. DAMAGE TO GOVERNMENT VEHICLE _____

17. DAMAGE TO PRIVATELY OWNED VEHICLE OR OTHER PROPERTY _____

18. ALWAYS SECURE NAMES AND ADDRESSES OF WITNESSES _____
Place _____ Address _____

19. Did city or State police report the accident? _____

20. If report was made, attach copy. _____

21. Government car was proceeding from _____ to _____

22. Was driver performing official duty? _____

23. Indicate the day: _____

24. SIGNATURE OF INVESTIGATING OFFICER _____

25. (over)

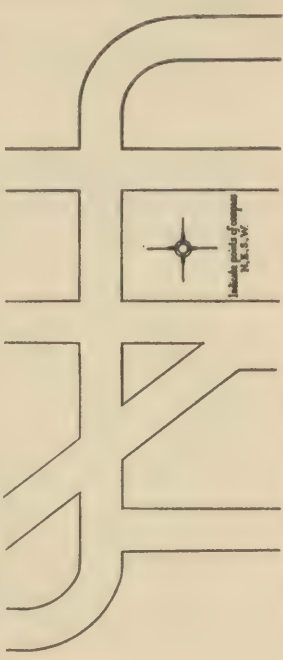
BACK

INVESTIGATING OFFICER'S SKETCH

Show in black the relative positions of the colliding vehicles, or of the vehicle and pedestrian, just before the collision, and at the time of the collision.

Show in red their relative positions just after the collision.

Label the streets and every object depicted, and indicate measurements; show by dotted lines the course followed by each vehicle, and add any explanatory statement that would aid in an understanding of the occurrence.



If the above diagram is not applicable, attach substitute diagram.

I hereby certify that the foregoing is a true and correct report of the accident, according to the best of my knowledge and belief, based upon investigation made by me personally. Attached hereto as a part hereof are the following papers: _____

Investigating Officer.

INSTRUCTIONS TO INVESTIGATING OFFICER

1. Attach driver's accident report, with supplemental signed statement from driver. Among other things, the driver's statement should contain, the names of the witnesses, the names of the vehicle, or person collided with, just before and at the time of the collision; the rates of speed and, if estimated, the signals of warning; condition of brakes, of lights, of streets as to being slippery; effects made by driver to avoid collision; facts showing whether or not other driver, or person was in fault, etc.

2. Attach signed statement from each witness.

3. Attach copy of traffic regulation violated, if any.

4. Attach photographs of scene of accident and of damaged car, if any taken.

5. Attach Findings and Recommendations of Investigating Officer.

Plate 62.

c. *Precautions against carbon monoxide gas.* To protect personnel against this colorless

Plate 63.

and odorless gas, which is a product of incomplete combustion, garages, shops, and vehicles carrying personnel must be well ventilated. No motor vehicle engine should be allowed to run in a garage or shop any longer than necessary to move it in or out unless it is standing near wide open doors or the exhaust gas is conducted through an open fixture.

Speed Limits. What speed is excessive? That depends on conditions. Any speed—even one mile per hour—unless tempered with judgment—is too fast.

The caution plate mounted on a military motor vehicle indicates the maximum safe speed for which the vehicle is designed. This speed presumes good operating conditions of vehicles, good roads, load, traffic conditions, and skilled driving.

<div>WAR DEPARTMENT Q. M. C. Form 224 (old 538) Revised Oct. 28, 1927</div> <div>STUB DUPLICATE</div> <div>Date U. S. A. Reg. No. Gasoline .....gal. Cyl. oil, heavy .....qt. " " med. ....qt. " " light. ....qt. Kerosene .....qt. Grease, trans. ....lb. " cup .....lb. Grease .....lb. (Signature of dispatcher) A-5441</div>	<div>WAR DEPARTMENT Q. M. C. Form 224 (old 538) Revised Oct. 28, 1927</div> <div>GASOLINE AND LUBRICANT ISSUE SLIP</div> <div>QUARTERMASTER CORPS, TRANSPORTATION SERVICE</div> <div>Post gasoline filling station Date..... Deliver to U. S. A. Reg. No. Gasoline.....gals. @ \$0. \$..... Cylinder oil, heavy.....qts. @ " " medium .....qts. @ " " light.....qts. @ Kerosene@ Grease, transmission .....lbs. @ " cup .....lbs. @ Grease .....lbs. @ TOTAL... \$..... (Signature of storekeeper) (Signature of dispatcher) 3-5441</div>
---	---

(NOTE INSTRUCTIONS ON REVERSE SIDE)

INSTRUCTIONS

This form will be made out by the DISPATCHER and forwarded to the DRIVER of vehicle as a request for gasoline, cylinder oils, kerosene, and greases to be withdrawn from the POST GASOLINE FILLING STATION.

At the close of business each day, the STOREKEEPER at the POST GASOLINE FILLING STATION will return all GASOLINE AND LUBRICANT ISSUE SLIPS to the DISPATCHER.

The DISPATCHER will check slips against stub duplicate and make any change which does not coincide with original slip, and then enter on Form Q. M. C. 222 (old No. 525) Motor Vehicle Operation and Maintenance Cost Record.

2-5441

Plate 64.

Road conditions dictate speed! Ice and snow—the severest speed dictators—always bring problems for the driver. He should first test the surface of the road by gently applying the brakes. Then if the vehicle does not skid, he should resume speed and apply the brakes again—this time a little more firmly. In this way he can determine the surface conditions and will know the degree of caution which he must exercise for safe driving.

Likewise the condition of rough and congested roads must govern the maximum safe speed.

Drivers of military motor vehicles must not exceed the limits set by law or regulations of

DRIVER'S DAILY OPERATION AND INSPECTION REPORT

(Organization)

(Station)

(Date)

(Driver's name)

(U. S. A. Reg. No.)

(Dispatcher's name)

(Vehicle type and capacity)

Time OUT

Time IN

Report to

Address

Work done:

OPERATION

Speedometer reading		Miles	Miles empty	Pass. tons hauled	Pass. ton miles	Gas start of day..... (gals.)
Start	Finish						Gas added..... (gals.)
						Total..... (gals.)
						Gas end of day..... (gals.)
						Gas used..... (gals.)
						Oil added (qts.)
						Grease added (lbs.)
						Trans. & diff. lub. added (lbs. or pts.)
Total						Was there an accident?

I certify that the vehicle was used for official business only.

(Signature of person using) (Grade)

(Front)

INSPECTION

	Before operation	After operation		Before operation	After operation
Water.....			Oil pressure gage.....		
Gas.....			Ammeter.....		
Oil, crankcase.....			Water pump.....		
Fuel and oil lines.....			Fan.....		
Lights (head, dimmers, parking, tail, stop, instrument board, dome).....			Engine lacks power.....		
Horn.....			Engine knocks or over heats.....		
Tires (including spare).....			Water temperature gage.....		
Front axle assembly.....			Wind shield wiper.....		
Oil, gas, water leaks.....			Clutch.....		
Equipment (including pyrene).....			Transmission (all gears).....		
Accident report.....			Foot brake.....		
Driver's permit.....			Emergency brake.....		
Water in battery.....			Tires changed.....		

Remarks:

I certify that I have made the necessary inspections before, during, and after operation and the vehicle appears to be in good condition except as noted above.

(Signature of driver)

Corrections made

(Section chief)

Recorded

(Truck master)

(Reverse)

the state or towns in which the vehicle is operated, nor those limitations imposed by commanders of certain military units and commands.

Many military motor vehicles have regulated governors, which, when installed, are set and sealed at the maximum speed considered safe. The driver is prohibited from tampering with these sealed governors.

Disciplinary Action. Failure to observe any of the safety precautions and speed limits, and motor vehicle abuses due to carelessness or indifference of responsible personnel, are considered cause in the military service for disciplinary action.

Forms. The forms used in connection with military motor vehicle operation supply data for the establishment of operating and maintenance costs and for other records. They also record information, as in the case of the *Accident Report*, which may be required in the future, and appraise higher commanders of the operating efficiency of their vehicles.

a. Driver's trip ticket and performance record. This form (*QMC Form 237*) accompanies each vehicle dispatched from a pool. Drivers are required to complete the form in full detail because the data obtained from the form are necessary to complete the *Motor Vehicle Service Record Book* (which may be compared to the service record of an enlisted man).

b. Accident report. The driver's report—*Accident, Standard Form No. 26*—must be prepared without delay on all motor vehicle accidents, however trivial, that result in injury to persons or property. The driver must be impressed with the necessity of filling out this report on the scene of the accident and at the time it occurs, so as to get the names of all available witnesses and other pertinent data that should be collected on the spot. This protects the driver and the government as well as the other persons involved in future action which may grow out of the accident. A supply of these forms must be in the vehicle whenever dispatched on a trip.

Upon receipt of *Standard Form No. 26*, the driver's immediate commanding officer notifies at once his own commanding officer. The latter makes an investigation of the accident, or details an officer to do so, when the report shows personal injury, damage to private property, or damage to government property in excess of \$10 for material and labor. A complete and detailed report will be made by the investigating officer on *Standard Form No. 27*. This report is forwarded to higher authority for the record and any further necessary action.

c. Daily dispatching record of motor vehicles. The form is self-explanatory. It is kept by the dispatchers of motor pools and serves as a valuable check on operations.

d. Gasoline and lubricant issue slip. The instructions on the back of the form explain its purpose.

e. Driver's daily operation and inspection report. A suitable form of *Driver's Daily Operation and Inspection Report* is given below. This form also can be used as a trip record. It should be printed on light cardboard, with the operation report on one side and the inspection report on the other. It may be desirable to vary this form to include other information particularly desired.

Road Inspections. At all times during operation, a driver must be on the alert to detect any malfunctioning of his vehicle. At the first opportunity he should report to his section chief any defect that he cannot remedy. He should frequently glance at the instrument panel to note engine temperature, oil pressure, and battery charging rate. During halts he should walk around his vehicle to note its general condition as to looseness of parts, shifting of load, deflation of tires, and the like.

CONVOY MOVEMENTS

General. Careful planning and systematic control are required to conduct group movements of motor vehicles—convoys. Neglect of either results in delay and even in failure to complete a move. This is especially true in the theater of operations where convoy control may become equivalent to tactical control, and where delay or failure may mean defeat.

But even in areas remote from hostilities the handling of convoys is far from being a simple operation of starting, traveling, and stopping. Here, too, there must be preliminary arrangements, a system of control and road procedure during the movement; a method of

maintenance and supply; and on long moves, a systematic occupation of, and departure from, bivouacs.

Size of Convoys. A convoy may contain as many vehicles as its purpose requires. It may consist of a unit, such as a completely motorized brigade of 600 to 700 vehicles, or only three or four trucks in a small train. A large convoy may be subdivided into serials or operating groups. Ordinarily, vehicles of the same general size and speed are formed together. Thus heavy, slow trucks would operate in one group, or serial, and light, fast vehicles in another. However, it may be necessary to mix types of vehicles in serials to maintain unity in tactical organizations on the road. When it is practicable, the serials of a convoy move over separate routes or follow in succession from 15 to 30 minutes apart. Serials in troop movements may follow without time interval.

Length of Run. A reasonable daylight run for a convoy of any size is 150 miles, assuming an average of eight hours of travel, average types of roads, and average difficulties. Unquestionably runs of 250 miles and even more can be made on good roads under good conditions of vehicles and traffic. On the other hand poor roads and heavy traffic may reduce a practicable day's march to considerably less than 150 miles.

A reasonable night run, when lights can be used, is 100 miles; when lights cannot be used, 50 miles.

Preliminary Steps. The plans and operations for movements of convoys oftentimes lead into the field of higher Command, Staff, and Logistics. In this chapter only the salient features of the subject will be sketched.

The convoy commander announces the basic decisions and plan and supervises the work of his staff, approves such orders as need be issued, and sees to it that all elements of the convoy are ready for the movement. If the convoy is provisional (not a standard organized unit) he ordinarily must appoint subordinate leaders as well as a staff. He inspects the convoy before departure, or if it is too large, he delegates this work to subordinates.

All subordinate commanders and leaders inspect their parts of the convoy before departure. All drivers inspect their vehicles, especially to check fuel, oil, and water. The matters which should be covered in the drivers' inspections are given in detail in "Driver's Daily Operation and Inspection Report."

Orders for group motor vehicle movements may vary from simple oral orders to "go from here to there" at a given time for a certain purpose, to a five-paragraph movement order, with appropriate annexes.

Conduct of a Convoy in Movement. The efficient movement of motors in groups depends largely upon the training of the individual drivers. A smooth chain of command is necessary, but in the final analysis, the ability of the individual driver that comes from training in group movements is a basic essential. The driver must not only know how to drive and take care of his vehicle but he must know the rules, signals, and regulations of the road so well that his response is automatically correct. Fortunately the things he must know are not difficult to learn. Their simplicity, however, must never be allowed to discount their importance and rigid adherence to their performance and observation.

The speed of the convoy is regulated, in addition to speeds prescribed in orders, by the leading vehicle, in which the operations officer rides and sets the pace for the column.

The convoy commander may exercise direct command of his column by radio, by using traffic personnel on motorcycles or in cars, and by moving to points in the column in his own vehicle. Control may also be exercised by prescribing periodic halts in orders. Visual or sound signals are used.

A convoy commander takes position in the column as the situation dictates, but ordinarily is at the head. There he can insure correct routing, make decisions in case of emergency, receive orders from higher authority, and control speeds. He obtains information of the progress of the convoy by using traffic assistants on motorcycles, or he may go back along the column himself. By taking a position at the head of the convoy he also obtains early information from his reconnaissance officer.

In small convoys, especially train convoys such as battalion combat trains and regimental field trains, it may be best for the convoy commander to move at the rear of the convoy so that he can give directions regarding disabled or delayed vehicles. This is especially true when one officer must perform all of the staff duties in addition to commanding the convoy.

The tactical situation, however, will often dictate that the commander of even a small convoy lead his column.

Speeds. Ordinarily, road speeds are governed by the type and condition of vehicles in operation and, in time of peace, by state and municipal speed limits. Convoy running speeds should be less than maximum speeds in order to allow a margin for vehicles to regain distances when delayed. Frequently, when the leading vehicle of a serial is moving at 35 miles per hour, the vehicles in the rear of the column must move at 40 or 45 miles per hour to regain their proper distances. A steady speed at a moderate rate is the sure one.

Road Distances. Open road distances in yards for motor trucks operating in convoy are approximately as follows:

	OPEN COUNTRY		CITIES
	Day	Night	Day or night
Between vehicles	100-250 yards	50-100 yards	15-20 yards (2 or 3 truck lengths)
Between sections	200-300 yards	200-300 yards	200-300 yards
Between serials	15-30 minutes	15-30 minutes	15-30 minutes

Trucks should close up to 15-20 yards when moving cross country. In passing through small towns and villages each vehicle in turn reduces speed but does not reduce road distance. On entering cities, or other populous areas, a convoy ordinarily reduces both speed and distances between vehicles. Road distance is primarily taken for safety's sake.

Halts. When urgency does not prohibit, a 15-minute halt should be made at the end of the first hour of running time, and halts of 10 minutes every two hours thereafter, with a long halt for refueling or meals, as necessary. It is desirable to combine the last two.

In halting, the leading vehicle halts and then the other vehicles in turn from front to rear close up and come to a stop slowly, pulling as far to the right of the road as conditions permit. It is usually best, unless the shoulders of the road are plainly substantial, to keep at least the left wheels on the pavement, and on some roads both wheels.

When a halt is made, each driver or assistant driver at once proceeds to make the required inspections. Personnel must stay to the right of the road, and when possible, on the right side of the vehicles. Section leaders personally see that each driver or assistant driver gives his vehicle due attention.

FIELD EXPEDIENTS

General. Although efficient road and route reconnaissance measures go far to insure the uninterrupted movement of motor vehicles, situations are nevertheless inevitable in which it is impossible to avoid obstacles and severe operating conditions. Lack of detailed information, errors in judgment on the part of operating personnel, and tactical and strategical necessity may at any time result in movements over bad ground or across obstacles. When this occurs field expedients covering the more common conditions that arise are described in the following paragraphs.

Cross Country Equipment. Every motorized organization should carry the following cross country equipment on each vehicle:

Towing hooks, front and rear

Towing cable (rope or chain)

Traction device (chains, grousers, ropes, half tracks)

Shovel

Axe

March Expedients. Many difficulties are likely to be encountered in operating both on roads and cross country. Where a thorough advance reconnaissance has been made, a motor column can be prepared to take immediate action to overcome unavoidable difficulties that remain. There follows a list of such difficulties with methods suggested for overcoming them.

a. On roads. (1) *Banked curves.* In going around banked curves on slippery roads vehicles tend to slide to the low side. It is best to drive cautiously and near the upper side of the curve. The use of sand or crushed rock on the road surface or the placing of pieces

of canvas, burlap sacks, brush, or similar material under the wheels may increase traction sufficiently. Cables can be attached to the upper side of the vehicle and men used to exert a lateral pull in order to keep the vehicle from sliding to the low side of the road.

(2) *Broken culverts.* Broken culverts can be filled or covered over with boards, metal plates, or any similar materials locally available.

(3) *High-crowned dirt roads.* High-crowned roads, when they are muddy or icy, form a serious obstacle to the rapid progress of motor vehicles. Vehicles, and towed loads as well, easily slide into the ditches. It is often advisable to use such roads only for one-way traffic, thus permitting vehicles to be driven astride the crown. This is only an emergency expedient for increasing the speed of traffic and not a remedy for such a condition.

(4) *Steep slopes.* Wet or very steep grades may present difficulties to ascending and descending vehicles. If the road is slippery, pavement traction can be obtained by placing sand, ashes, crushed rock, canvas, or sacks under the wheels. On badly washed slopes, pioneer work is generally necessary.

Vehicles unable to climb steep grades, owing to lack of power can be towed or pushed by another vehicle. If pushing is used, a large timber or old casing should be lashed in front of the bumper of the assisting vehicle.

In descending short, steep grades where the momentum of a vehicle may exceed its braking power, a capstan or snubbing post improvised at the top of the slope by wrapping a cable around a convenient tree or post is usually satisfactory.

(5) *Dangerous curves.* Control personnel should be stationed near dangerous curves to signal drivers of approaching vehicles to reduce speed, or signs should be placed to warn of the danger.

(6) *Narrow bridges.* Narrow bridges should be approached with caution and at reduced speed. A wheel guide to prevent collision with the bridge rails may well be constructed.

(7) *Bridges without side rails.* The risk of accident on bridges that have no side rails should not be taken, for a wheel over the side will not only cause delay but is also likely to cause a serious traffic jam. A timber or rail secured in place will ordinarily keep the wheels of vehicles on the bridge.

(8) *Mud and snow.* Tire chains are usually essential for operation in mud and snow.

b. *Across country.* (1) *Traction devices.* When their use is necessary in traveling across country, traction devices should always be installed as soon as need for them becomes apparent. They should be promptly removed when they are no longer needed.

(2) *Heavy ground and steep grades.* In going through clay, mud, or sand, and on steep grades, a driver should always shift down to the proper gear ratio. The shifting should be completed before reaching the bad stretch or grade. Stalling due to loss of momentum is likely to occur if the driver attempts to shift as his vehicle enters the heavy going. Once his vehicle has entered it, he should not accelerate the engine so much that the driving wheels spin. This usually accomplishes nothing except to sink the wheels down and wear out the tires. Heavy chicken wire stretched out and pegged to the ground, wheel mats, salvaged burlap, or, if the emergency warrants, blankets, provide excellent traction in deep clay, mud, and sand.

(3) *Keeping wheels clean.* In crossing wet clay fields covered with grass or vegetation, wheels become caked with matted mud to such an increased size that they seriously impede progress. This accumulation can be prevented to some extent by fixing knives, boards, or shovels in such a position as to cut away foreign matter as the wheels revolve.

(4) *Wooded terrain.* For a movement through heavily wooded country, the trail should be blazed by an advance party whenever possible. A pioneer section, working at the head of the main column, cuts and removes timber to clear the road. All timber should be cut flush with the ground. Small brush less than one and a half inches in diameter need not be cut. It is negligible as an impediment, and trucks eventually knock it down and work it loose at the roots. Dirt thrown up on either side of large fallen timber affords an easier crossing.

(5) *Swamps.* The passage of swamps can be ordinarily effected by placing boards, brush, and similar materials under the wheels or tracks to increase ground support. This material must be held down until at least one vehicle has passed over it.

(6) *Shelled areas.* Shelled areas vary from those that have been sparsely shelled to those in which the craters interlock or the terrain has been completely upheaved. Occasional craters in roads, trails, or other positions can usually be detoured. If not, they must be filled or bridged to permit passage. A thorough reconnaissance is necessary before badly torn up areas can be crossed. The best route must be marked and all necessary pioneer work completed in advance. Where the soil has been torn up badly, it may be necessary to corduroy short stretches with any suitable material at hand. Where the soil is soft from extremely heavy shelling and wet weather, great care should be exercised to prevent stalling or damaging vehicles against hidden stumps or rocks, or in deep craters, which are often filled with water.

(7) *Trenches.* Narrow trenches can be crossed by constructing improvised bridges of channel iron, planks, logs, or poles, if materials are available. Crossings for wider trenches can often be formed by breaking down the sides and filling in the trench itself. To prevent miring in wet weather, the bottom of a trench must be filled with solid material.

(8) *Ditches.* The banks of a ditch should be cut away enough to permit the passage of leading vehicles. Others following usually improve the passage. If the bottom is muddy, it should be filled with solid material. If logs can be obtained for this purpose, they should be cut from three to five feet wider than the over-all width of the vehicles and placed in the bottom of the ditch at right angles to the direction of crossing.

In crossing a ditch, a vehicle should be put in its lowest forward gear. On the descent the clutch should be disengaged and the brakes used to control the speed. When the bottom is reached, the brakes should be released, the clutch engaged, and the motor accelerated, so that the momentum is not lost.

Narrow, deep ditches or streams require similar measures to those used in crossing trenches. If ramping is employed, provision must be made for the flow of water under the roadbed.

(9) *Fords.* The depth of a ford should be measured. If it is less than the height of a vehicle's electrical equipment or carburetor, the vehicle can cross the ford under its own power if the ford is otherwise passable. In crossing, a vehicle should proceed slowly, using the lowest gear ratio. If the ford is deep enough for the fan to catch water, the fan belt should be slipped off before crossing in order to prevent water from being thrown on the electrical units.

(10) *Crossing deep streams.* In war, tactical requirements often necessitate the crossing of deep streams by motorized units. Battalions and larger units will ordinarily use bridges or ferries already in place or constructed by engineer units for a given passage.

Low Temperature Operation. Measures useful in the field in cold weather follow.

a. During cold weather rubber tires and tracks adhere to wet soil, and this often freezes during a halt. Before moving the vehicles, the tracks or tires should be broken free from the ground.

b. When vehicles are parked in freezing weather or when freezing weather is expected, the brakes should never be set to hold the vehicle in place. All brakes on the vehicle should be released and the gear lever set either in reverse or low-speed position, or blocks used under the wheels. Otherwise the brake lining may freeze to the drum.

c. In parking vehicles off the road during overnight halts, ground should be selected that will remain firm even if it should rain during the night. If such ground is not available, provision must be made for satisfactory driving-wheel traction for at least one vehicle so that the other vehicles can be pulled or towed to solid ground with the least possible delay as soon as they are needed. To do this it may even be necessary to keep the rear wheels of one vehicle on the edge of the road.

Camp Expedients. Every effort should be made to provide for the shelter and comfort of the maintenance section. In the absence of buildings, temporary shelters from paulins, brush, and other such materials should be erected. When necessary, heat should be supplied; otherwise, the quality and quantity of the men's work will be affected. The lights used by the maintenance crew when working at night during campaign must be shielded from observation, especially from the air.

When the only available water is too dirty for use in the cooling system of vehicles, it

should be strained. If time and means permit, water can be boiled and floating sediment skimmed off. As the water cools, most of the remaining sediment will settle to the bottom of the container.

Moving Stalled Vehicles. Vehicles of less than 1½-ton capacity can ordinarily be pushed through or over an obstacle by four to eight men.

When a vehicle digs itself in because the driving wheels fail to obtain traction, further effort to move the vehicle under its power is futile. When it is possible, a towing vehicle should be placed on solid ground, dirt removed from in front of the wheels of the stalled vehicle, and from in front of its front axle and any power-train units that may be resting on the ground. As the towing is started, the stalled vehicle can usually assist in maintaining motion with its own power.

A stalled vehicle of the dual driving type may use its own power to get out of a bad spot. A rope is tied between each pair of dual driving wheels and the other end of the rope anchored to trees or posts not more than eight feet apart. The driving wheels are then revolved slowly to take up the slack in the ropes. As soon as all slack is removed, the engine is accelerated. The rope then winds around the wheels, pulling the vehicle out of or across the bad stretch.

Mired vehicles can often be moved by the use of a block and tackle. If this method fails, however, the attempt should not be repeated at once. The wheel tracks should first be cleared and laid with brush, stone, lumber, or other suitable material. If jacks can be employed, the vehicle should be raised and similar material put under the wheels. The vehicle can then be moved by block and tackle, with little difficulty.

Often a mired vehicle can be removed under its own power by cleaning out the wheel tracks and putting solid materials in them.

CHAPTER XIII

MILITARY COURTESY

"Send me men who can shoot and salute."—PERSHING.

Definition. Courtesy consists of acts of politeness, of civility and respect. It includes as an essential element a full and proper appreciation of the rights of others. Military courtesy is the term used to classify or include those special acts and ceremonial procedures which are required between members of the service, or which are habitually observed because of the equally strong force of custom and usage. In addition to many prescribed formalities it includes all of those common acts of civility, good breeding and thoughtfulness which are observed by gentlemen in all activities. It is a necessary part of private and official life. Courtesy encourages harmonious relationships between individuals, it facilitates the conduct of affairs, and adds a smooth and pleasant note to human contacts. It has been observed that whenever the common acts of courtesy disappear from a military unit discipline ceases to function. Hence, the truth of the official statement, "Courtesy among military men is indispensable to discipline," is borne out by history and experience.

The application of courtesy among military men includes within its scope the relationships between officers and soldiers, and the acts of courtesy or homage which are extended on proper occasion by all members of the Army of the United States to the national anthem, the bugle call *To the Color (Standard)*, and to the national flag, national and regimental colors or standards.

History of the Military Salute. Men of arms have used some form of the military salute as an exchange of greeting since the earliest times. It has been preserved and its use continued in all modern armies which inherit their military traditions from the Age of Chivalry. The method of rendering the salute has varied through the ages, as it still varies in form between the armies of today. Whatever the form it has taken, it has always pertained to military men, and its use definitely restricted to those in good standing. Colonel Applin¹ spoke of the salute as "a sign of recognition between men of an honorable profession."

The genesis of the military salute is shrouded in the mysteries of the ages. It is known that in the Age of Chivalry the knights were all mounted and wore steel armor which covered the body completely, including the head and face. When two friendly knights met it was the custom for each to raise the visor and expose his face to the view of the other. This was always done with the right hand, the left being used to hold the reins. It was a significant gesture of friendship and confidence, since it exposed the features and also removed the right hand—the sword hand—from the vicinity of the weapon. Also, in ancient times, the freemen (soldiers) of Europe were allowed to carry arms; when two freemen met, each would raise his right hand to show that he held no weapon in it and that the meeting was a friendly one. Slaves were not allowed to carry arms; and they passed freemen without the exchange of a greeting. In the Middle Ages gentlemen often went about clothed in heavy capes under which swords were carried; upon meeting a friend, the cloak was thrown back by raising the right arm, thus disclosing that the right hand was not on the sword hilt. The civilian counterpart of the salute is manifested in various ways such as raising the hand when greeting a friend, tipping the hat when meeting a lady, and using a sign of recognition between lodge members. This sign is always one of greeting between friends and is given willingly. The military salute is given in the same manner—that of pride in giving recognition to a comrade in the honorable profession of arms. The knightly gesture of raising the hand to the visor came to be recognized as the proper greeting between soldiers, and was continued even after modern firearms had made steel armor a thing of the past. The military salute is

¹ A distinguished officer of the British Army who headed an important mission to the United States during the World War. While on this mission Colonel Applin delivered a series of speeches which are still read and widely quoted.

today, as it seems always to have been, a unique form of exchange of greeting between military men.

How the Salute Is Given. The *hand salute* (Plate 1) is always executed at *attention*. As a drill it is executed at the command: 1. *Hand*, 2. *SALUTE*. At the command *SALUTE* the right hand is raised smartly until the tip of the forefinger touches the lower part of the headdress, or forehead (when no headdress is worn), above and slightly to the right of the right eye; thumb and fingers are extended and joined; palm to the left; upper arm horizontal; forearm inclined at about 45 degrees; hand and wrist straight; at the same time the head and eyes are turned towards the person saluted. The second movement consists of dropping the hand smartly to the side and turning the head and eyes to the front. This movement is executed when the salute has been returned, or, when executed as a drill, at the command *TWO*. The salute is always given with the right hand. It is never given while at the *double time*, nor, if mounted, while at a gait faster than a walk; the proper procedure in these cases is to decrease the rate to *quick time* or to the *walk*, respectively, and then resume the increased gait.

The salute to be rendered with arms in hand is that which is prescribed for that arm. For example, the rifle salute and the salute with the saber.

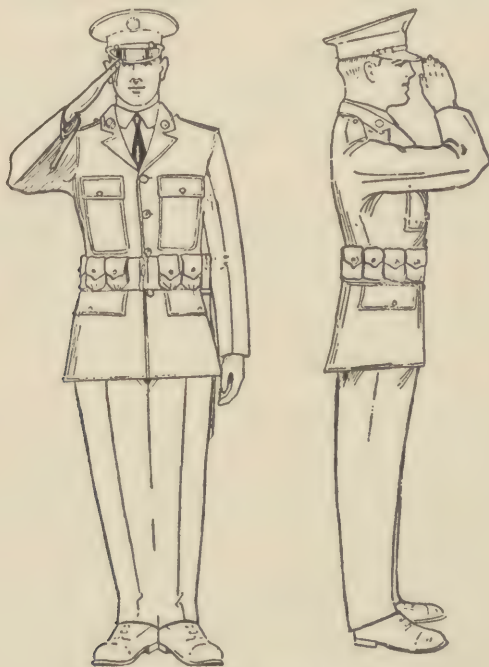


Plate 1. The Hand Salute.

Saluting Distance is that within which the salute is rendered. It is the distance within which recognition is easy, and usually does not exceed thirty paces. The salute is begun when about six paces from the person or colors saluted or, in case the approach is outside that distance, six paces from the point nearest approach.

Whom to Salute. The compliment of the salute is paid to all officers of the Army of the United States, and to all officers of the Navy and Marine Corps. All persons in the military service are especially enjoined at all times and in all situations to pay the same compliments to officers of the Navy and Marine Corps, and to officers of the National Guard and Officers' Reserve Corps, when in uniform, as to officers of the Regular Army.

In exchanging salutations with civilians on nonofficial occasions, persons in the military service may salute or follow the custom usually observed in civil life.

It is not inappropriate to salute ladies as an act of courtesy in extending a greeting.

Enlisted men salute one another under some circumstances, such as making a report to the platoon sergeant or 1st sergeant at the formation of a company; they do not exchange salutes as a greeting.

The salute rendered the national anthem and the national color is discussed later in this chapter.

Out of Doors Defined. Structures such as drill halls, riding halls, gymnasiums, and other roofed inclosures used for drill or exercise of troops are considered "out of doors."

Indoors Defined. When the word "indoors" is used in this chapter it is construed to mean being in offices, hallways, kitchens, orderly rooms, amusement rooms, bath-rooms, dwellings, and other buildings or portions of buildings unless excluded by the paragraph above.

Under Arms Defined. The expression "under arms" means with arms in hand, or having attached to the person a hand arm or the equipment pertaining directly to the arm, such as a cartridge belt, pistol holster, or automatic rifle belt. There is an exception to this rule in that an officer wearing the officers' belt, M1921 (the "Sam Browne belt"), without arms attached, is considered "not under arms."

Occasions for the Salute. *Out of doors* all officers and enlisted men exchange salutes except under certain special exceptions which are stated in a later paragraph.

Indoors the exchange of salutes is not ordinarily required except when making or receiving official reports. For example: The Officer of the Day reporting to the commanding officer or a newly joined officer reporting for duty to the adjutant. A sentinel on duty indoors renders the salute.

An enlisted man posted as a sentinel indoors or a guard in formation indoors will render the salute as for outdoors.

The junior salutes first. There is an exception when the salute is introductory to a report at a military ceremony or formation to a representative of a common superior; for example, to the adjutant, in which case the officer making the report, whatever his rank, will salute first and the officer to whom the report is made will acknowledge, by saluting, that he has received and understood the report. It is considered as great a breach of military courtesy for a senior, through lack of attention, to fail to return a salute as it is for the junior to fail to give the salute in the first place.

When not on duty the salute between officers is usually accompanied by verbal salutation.

When several officers are together in a group and a salute is rendered, all entitled to the salute return it.

In formation the commander of the unit receives and returns the salute; other officers in the formation do not return it.

Out of doors an enlisted man, if seated, except when in a vehicle, will arise upon the approach of an officer, face toward him, stand at attention and salute. If the officer remains in the immediate vicinity the salute need not be repeated.

The wearing of civilian clothing makes no change in the occasions for rendering or returning a salute.

Outdoors where a number of enlisted men are together, but not in formation, all salute unless engaged in an activity where saluting is not required.

Salutes are exchanged in the same manner by individuals whether covered or uncovered.

A soldier addressed by an officer will stand at *ATTENTION*, salute, remain standing at attention during the conversation, and upon its completion will again salute. This procedure holds indoors and out of doors, and with but two exceptions, under all conditions. A soldier in ranks at drill comes to attention, but does not salute; a soldier working in an office or shop does not salute, nor if seated does he rise. Indoors a soldier who is covered, and not under arms, removes his headdress when addressed by an officer.

The following examples illustrate the prescribed courtesies rendered by a unit in formation.

(1) Soldiers are in ranks, at rest or at ease, noncommissioned officer in command. An officer passes in front of the unit. It is called to attention and the noncommissioned officer salutes. If the officer passes in *rear* of the unit it is brought to attention while he is opposite the post of the commander. The latter faces to the front but does not salute.

(2) Soldiers are in ranks at rest or at ease, officer in command. An officer of rank equal or junior approaches: the officers exchange salutes, the organization remaining at rest or at ease. If an officer of rank above that of the commander approaches, the procedure is that explained under (1) above.

(3) An organization is in formation, marching at route step, officer in command. An officer of rank equal or junior to commander passes: officers exchange salutes, organization not being called to attention. If the officer who passes is of rank above that of the commander, the organization is called to attention and the officers exchange salutes.

(4) A unit is marching at route step with a noncommissioned officer in command. It passes an officer of any rank: the noncommissioned officer calls the unit to attention and salutes.

(5) Detachments are marching at route step, noncommissioned officers in command. When they pass each other they are not called to attention and salutes are not exchanged by detachment commanders. This does not apply to the old and new guards after guard mounting.

Courtesies Which Omit the Salute. When at a post, camp, or station, an officer enters a room or tent, other than an office or mess hall, in which there is an enlisted man, the latter will stand at attention and uncover, if not under arms, until the officer directs otherwise or leaves the room. When there are two or more enlisted men in the room or tent, the first one who observes the entrance of the officer will command *ATTENTION*, whereupon all rise, uncover if not under arms, and remain standing at attention until the officer directs otherwise or leaves the room. This courtesy is applicable in squad rooms, unit recreation rooms, and in barracks generally; it is not used at assemblies which include the general public, nor within a post exchange or restaurant, or at the post theater.

When an officer enters a mess hall or tent, enlisted men seated at meals will remain seated "at ease" and continue eating unless the officer directs otherwise.

An enlisted man in ranks, if not at attention, assumes the position of attention when directly addressed by an officer.

On official occasions officers enter an automobile or small boat in inverse order of rank, unless otherwise directed, reserving the right rear seat for the senior officer. In leaving the conveyance this order is reversed.

Whenever an enlisted man enters a room where an officer is present he will uncover, if not under arms.

Occasions When Salutes and Honors Are Not Observed. No salute is rendered when on the march, in trenches, when at the double time or gallop. Honors as a rule are not paid by troops engaged in drill or in the field under campaign or simulated campaign conditions. Troops on the service of security pay no honors whatever.

Indoors, salutes are not ordinarily exchanged between officers and enlisted men except when addressing each other. Even this requirement is waived when an officer enters a room or tent used as an office or work shop, as those at work therein are not required to cease work unless addressed by the officer, nor leave their seats in the transaction of ordinary business.

Soldiers actually at work outdoors do not cease work to salute unless addressed by an officer.

Salutes are not required between officers when either is driving an automobile or when either is so occupied that saluting is impracticable.

An officer or soldier engaged in any of the following activities is not required to salute: While actively participating in a game; at mess; in a public conveyance; while driving a vehicle in motion; the driver of an animal-drawn vehicle while halted if both hands are required to control the animals attached thereto; at an assembly for purposes of social diversion or amusement; while leading an animal or standing to horse; while carrying articles with both hands or otherwise being so occupied as to make saluting impracticable.

Off duty outside the confines of military posts, camps, or stations the enlisted man does not salute unless addressed by an officer.

An enlisted man in a military formation will not salute unless he is in command thereof.

An officer in a military formation will not be saluted unless he is in command thereof.

Uncovering (Removal of Headdress). Officers and enlisted men under arms as a general rule do not uncover except when: Seated as a member of, or in attendance on, a court or board (sentinels over prisoners do not uncover); entering places of divine worship; indoors when it is desired to remain informally, or in attendance at official receptions.

Ruffles and Flourishes. On prescribed occasions special honors are paid to persons of high rank which include *ruffles* and *flourishes*. The command presents arms, the drums of the band giving the ruffles and the buglers sounding the flourishes. At the instant arms are presented, officers and men who are not in formation but who are in view and within saluting distance of the person thus honored, salute and remain in the first position of the salute until the end of the ruffles and flourishes, or until the command *Order arms* is given to the troops. The saluting distance must be construed to include a large area in this case, and the courtesy rendered by all in observation of the honor without regard to the actual distance in yards.

Courts-Martial. The following example illustrates a soldier's conduct when a witness at a court-martial: The judge advocate calls for the witness, "Private Smith." Formerly, witnesses wore side arms and hence did not remove the headdress until about to be sworn. Under present regulations (*Par 55, AR 600-40*) side arms are prohibited, and the proper procedure would be to remove the headdress before entering the room. The witness salutes the president of the court. If gloves have been prescribed the right glove is removed by the witness before he is sworn. When the judge advocate says: "You will be sworn as a witness in this case," the witness raises his right hand above his head, palm to the front, and when the oath has been repeated by the judge advocate, he replies: "I do" or "So help me God." He sits in the chair indicated by the judge advocate. In answer to the question by the judge advocate: "Do you know the accused, if so state who he is," he answers: "I do, Private John Doe, Company A, 6th Engineers." The witness then answers all other questions, addressing his answers to the court. When excused he rises, salutes the president, and leaves the room.

At the Pay Table. The company is formed in the order in which the names appear on the payroll. It is customary for the men to wear side arms. Each man, as his name is called, answers "Here" in a loud clear tone, steps up to the table, salutes the paymaster, counts his money as the paymaster spreads it before him, but does not touch it until the paymaster has finished counting it and has pushed it toward him. He then picks it up quickly and leaves the room. The paymaster does not return the salute of the soldier as he is too much occupied with his duties.

Military Funerals. At a military funeral all persons in the military service in uniform or civilian clothes, attending in their individual capacity or as honorary pallbearers, will stand at attention, uncovered, and hold the headdress over the left breast while the casket is being carried from the caisson to and lowered into the grave. During the prayer they also bow their heads. In cold or inclement weather they will remain covered and will execute the hand salute. This will also apply to the chaplain except during the reading of the service.

While the casket is being carried from the house to the caisson, from the caisson to the church, or from the church to the caisson, they will stand at attention, uncover, and place the headdress over the left breast. In cold or inclement weather they will remain covered and will execute the hand salute.

They will salute the casket as it passes *in any military funeral at any time or place* by facing the casket, assuming the position of attention, uncovering, and placing the headdress over the left breast. In cold or inclement weather they will remain covered and will execute the hand salute.

The active pallbearers while carrying the casket will remain covered; at other times they will conform to the above procedure.

Military funerals are more fully covered in Chapter XIV.

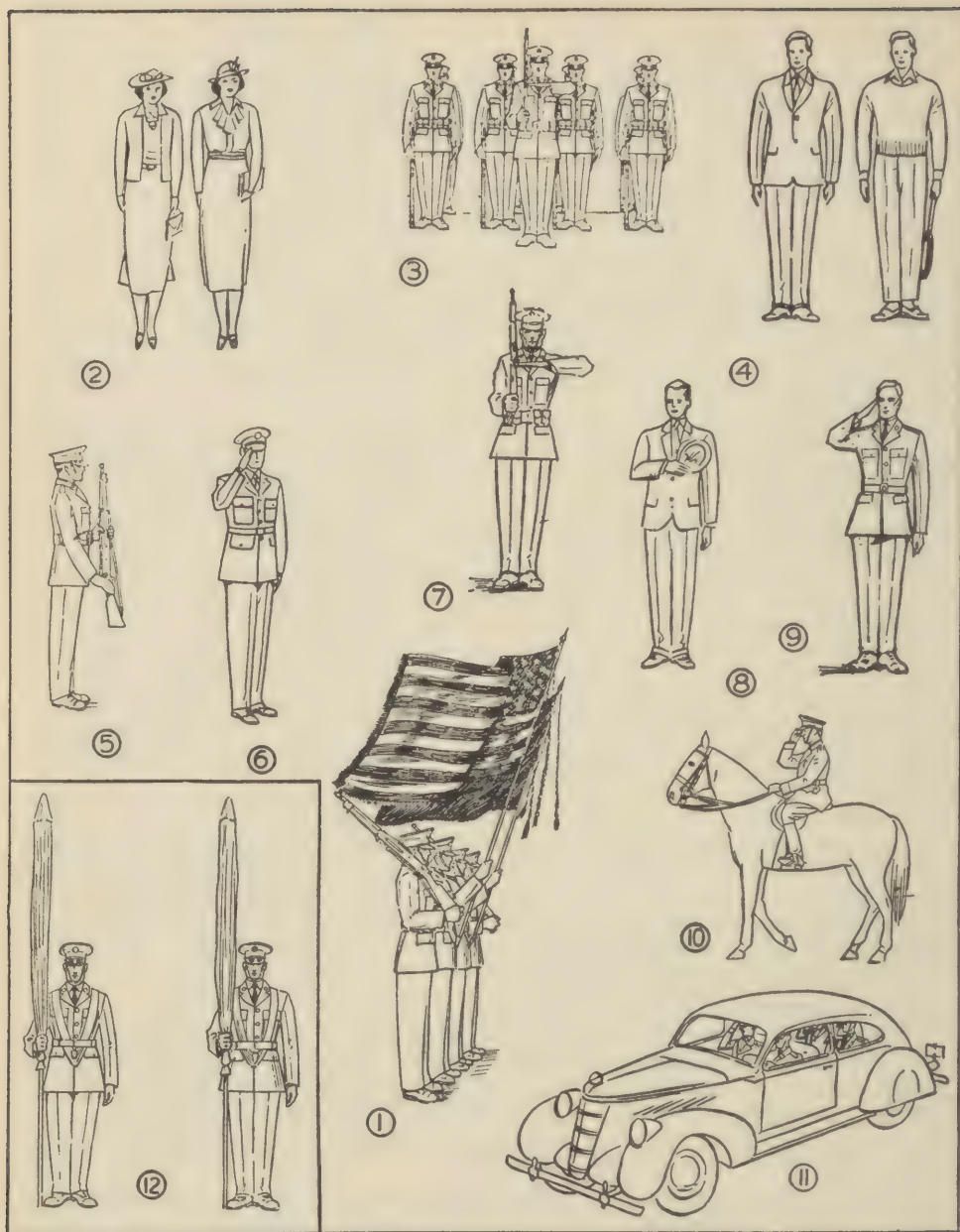


Plate 2. Courtesies to the Color or Standard.

1. The Colors and Color Guard.
2. Ladies.
3. Detachment in ranks under arms.
4. Officer, soldier, or civilian in civilian clothes or athletic costume uncovered.
5. Sentinel on post.
6. Soldier in uniform (covered), not under arms.
7. Soldier under arms.
8. Officer, soldier, or civilian, in civilian clothes, covered.
9. Soldier in uniform but uncovered.
10. Mounted officer moving at the "walk".
11. Driver and passengers of a vehicle in motion.
12. The Colors cased. They are never saluted when cased.

Courtesies to the National Anthem. Except at the ceremonies of *Escort of the color* and at *Retreat*, whenever or wherever the national anthem is played or *To the Color (Standard)* is sounded, at the first note thereof all dismounted officers and men present but not in formation stand at attention facing the *music* and render the prescribed salute. The position of salute is held until the last note of the music is sounded. Those mounted on animals halt and render the salute mounted. Persons riding in passenger cars or motorcycles (including the drivers) dismount and salute, facing the music, when not in formation and the national anthem is played. Occupants of other types of motor vehicles (types other than passenger cars and motorcycles) remain seated in the vehicles at "attention," and the person in charge of the vehicle dismounts to render the hand salute. The procedure for tank commanders is an exception to the general rule; they salute from the vehicle. Individuals leading animals or standing-to-horse stand at attention but do not salute.

Officers and enlisted men when not in uniform render the salute to the national anthem by standing at attention, uncovered, holding the headdress, if any, over the left breast. When in uniform indoors and uncovered, they salute the national anthem by standing at attention. At assemblies in theaters, assembly halls, or stadiums and other public gathering places where, in order to face the music in saluting the national anthem, it is necessary for individuals to face about or to a flank, officers and enlisted men face the original front.

At parades and other ceremonies under arms the command renders the salute prescribed and remains in the position of salute while the national anthem or *To the Color (Standard)* is being played. If not under arms, the organization is brought to attention at the first note of this music and the prescribed salute rendered by the officer or noncommissioned officer in command.

Courtesies to the Flag. *Retreat* is the ceremony which attends the lowering of the flag of a military post at or near sunset. The military formation pertaining to the ceremony includes a salute to the flag, and notwithstanding the playing of the national anthem or *To the Color* as a part of the ceremony, the flag receives the homage and courtesy.

Individuals who are not in a military formation render the same courtesies exactly as described above for the national anthem, *except* that they face the flag instead of the band or field music.

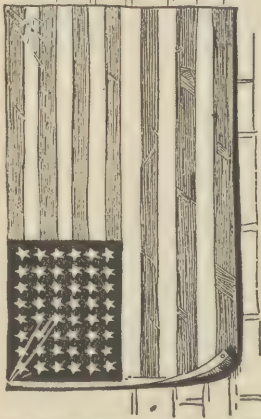
Courtesies to National and Regimental Colors. *Escort of the Color* is a ceremony honoring the national color or standard.

All persons in the military service and all bodies of troops salute the uncased national or regimental color (standard). When field music is present with an organization, *To the Color (Standard)* is sounded. This courtesy finds its greatest application when the colors are displayed by a marching organization, as at a parade, or when placed in front of the commanding officer's tent or headquarters. Individuals who are not in a military formation render courtesies in the same manner as heretofore described.

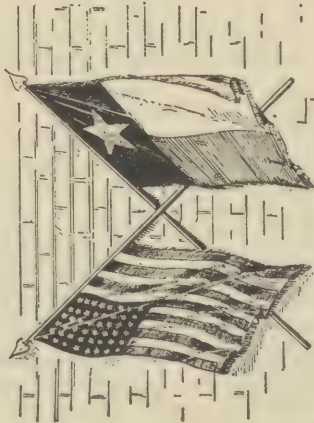
The Flag of the United States. *Definition.* Four different names for the flag of the United States are in use in the military service: flag, color, standard, and ensign. In general, the term "flag" is applicable regardless of size and use, but the other three terms have special usages as follows:

- (1) A *color* is a flag carried by dismounted units.
- (2) A *standard* is a flag carried by mounted or motorized units.
- (3) An *ensign* is a flag flown on ships, small boats and airships. In the military service the general term "flag" is used only when none of the other terms are applicable. Ordinarily, when we speak of "flags" we do not mean colors, standards, or ensigns.

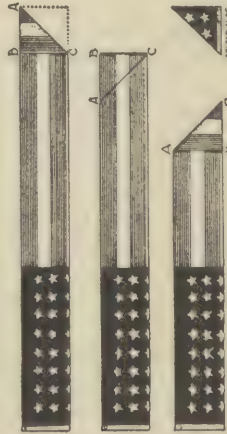
Display and Use of the Flag. (See Plate 3.) International usage forbids the display of the flag of one nation above another nation's in time of peace. When the flags of two or more nations are to be displayed, they should be flown from separate staffs, or from separate halyards, of equal size and on the same level. There is no federal law governing the subject, but the national flag, when not flown from a staff, should always be hung flat, whether indoors or out. It should not be festooned over doorways or arches, nor tied in a bowknot, nor fashioned into a rosette. When used on a rostrum, it should be displayed above and behind the speaker's desk. It should never be used to cover the speaker's desk nor to drape over the front of the platform. For this latter purpose, as



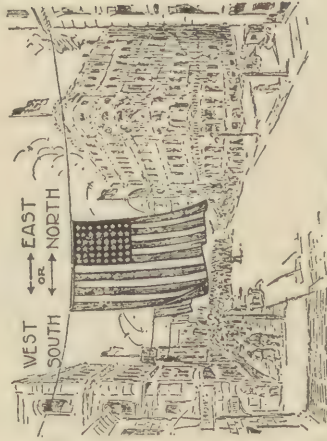
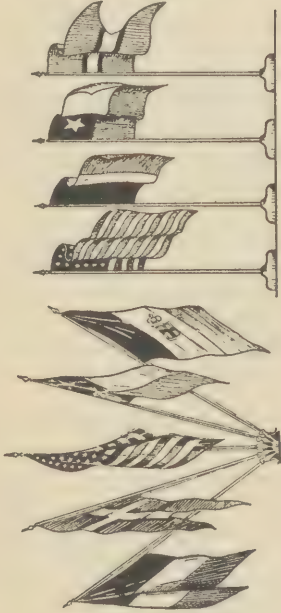
Vertically Against a Wall.



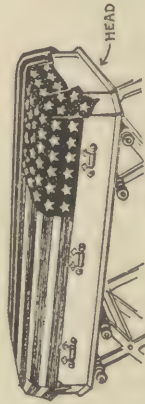
Against a Wall with Another Flag.



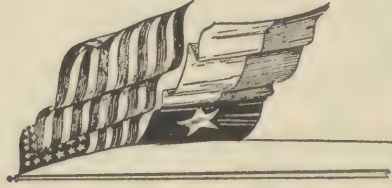
How to Fold the Flag.



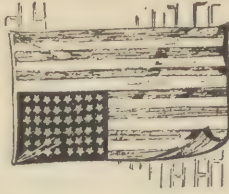
Across a Street.



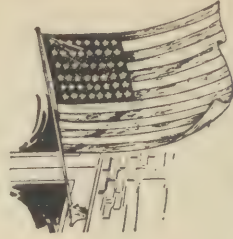
On a Casket.



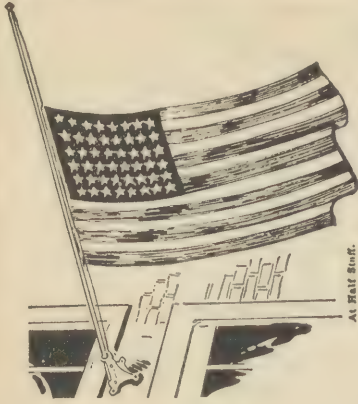
With Another Flag on a Pole.



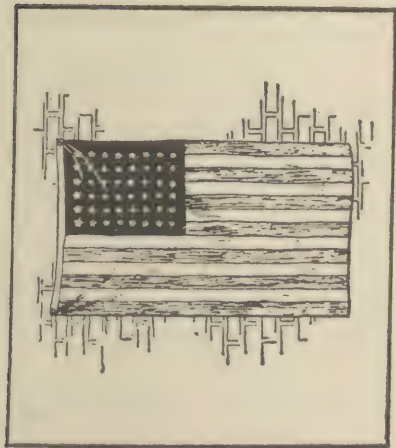
Vertically Against a Wall.



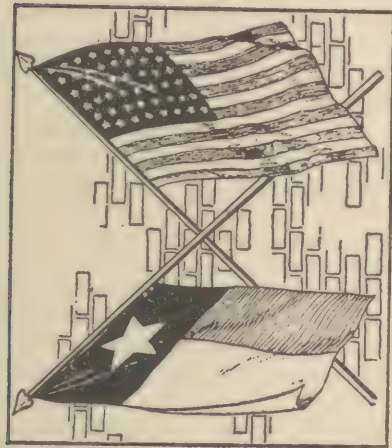
From a Horizontal Staff.



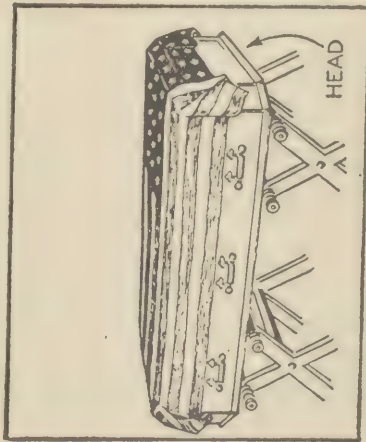
At Half Staff.



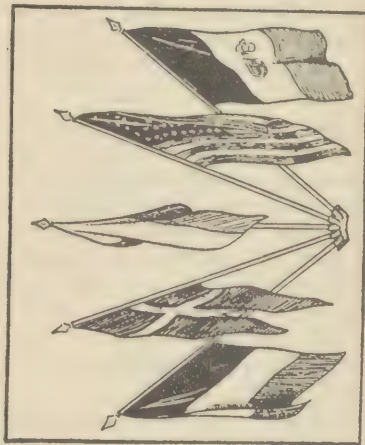
1



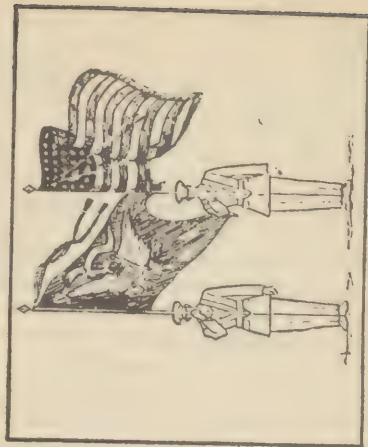
2



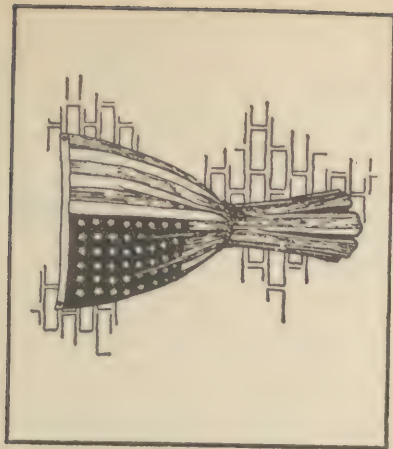
4



5



6



3

Plate 4. What's Wrong With These Pictures?

well as for decoration in general, bunting of the national colors should be used and the colors should be arranged with the blue above, the white in the middle, and the red below. Under no circumstances should the flag be draped over chairs or benches, nor should any object or emblem of any kind be placed above or upon it, nor should it be hung where it can be easily contaminated or soiled. No lettering of any kind should ever be placed upon the flag. It should not be used for advertising purposes. It should not be used as a portion of a woman's costume nor of a man's athletic clothing. When carried with other flags the national flag should always be on the right (as color bearers are facing) or in front. When a number of flags are grouped and displayed from staffs the national flag should always be in the center or at the highest point of the group.

When the flag is displayed at half staff it is first hoisted to the top of the staff and then lowered to the half staff position. Before lowering the flag for the day it is again raised to the top of the staff and then lowered. When the flag is lowered from the staff, no portion of it is allowed to touch the ground, either in lowering or folding.

When flown at a military post, or when carried by troops, the national flag is never dipped by way of salute or compliment. The regimental color or standard salutes in all military ceremonies while the national anthem or *To the Color* is being played and when rendering honors to its regimental commander or an individual of higher rank, but in no other case. This is done by lowering the pike (as the staff of a color is called) to the front so that it makes an angle of about 45 degrees with the ground. The national flag is used to cover the casket at the military funeral of present or former members of the military service. It is placed lengthwise on the casket with the union at the head and over the left shoulder of the deceased. The flag is not lowered into the grave and is not allowed to touch the ground.

Visits of Courtesy (Calling). Visits of courtesy or calling may be placed in two general classifications. First, calls made by newly arrived officers, or officers departing from duty at a station, upon certain prescribed military superiors; second, calls made upon newly arrived officers by other officers on duty at the station.

A newly arrived officer who will remain at the post, camp, or station for over 24 hours will pay a visit of courtesy to the commanding officer thereof. When the newly arrived officer is the senior, the commanding officer will pay the first visit. Following that call, an officer assigned or attached thereat will pay a visit to his immediate commanding officer and to the commanding officer of the coast defense, regiment, separate battalion, or similar organization to which so assigned or attached, when such officers reside at or near the post, camp, or station.

Each officer permanently assigned to duty at and living in or near a post, camp, or station will pay a visit of courtesy to each officer who has more recently arrived under permanent assignment at the same post, camp, or station. When conditions are such as to make compliance with this requirement burdensome and impracticable, the commanding officer may modify these requirements as he may deem necessary. For example, at large stations an official reception may be held to serve the purpose of both the required call and its return; in Washington, D. C. other special modifications apply.

The interchange of visits of courtesy between officers is of great importance and the well-established customs of the Army in this respect are required to be scrupulously observed. Failure to pay the civilities customary in official and polite society is to the prejudice of the best interests of the service. Visits of courtesy are expected to be paid promptly and be brief. They should be made at a time presumably convenient to the officer upon whom the call is made and, unless otherwise indicated, at his quarters.

Visits of courtesy, other than those paid by departing officers, will be returned promptly and in person, except that a general officer may designate a staff officer to return the visit of courtesy of an officer below the grade of colonel. In case of sickness or other unavoidable circumstances, such visits may be omitted, in which event an officer should, if possible, send his visiting card upon which he has noted briefly his regrets and the cause of his failure to pay the visit.

"Life is not so short but that there is always time enough for courtesy."—EMERSON.

CHAPTER XIV

CUSTOMS OF THE SERVICE

"Nothing is stronger than custom."—OVID.

Origin and Nature of Customs. A custom is an established usage. Customs include positive actions—things to do—and taboos—things to avoid doing. Like life itself, the customs which man observes are subject to a constant but slow process of change. Many practices which were habitual a generation or two ago have passed through a period of declining observance, and then into the limbo of the forgotten. New customs arise to supplant the old. The resurrection of those which have become outmoded would first be thought amusing, then queer. Others live on and on without apparent change. Man is eager to rely upon established practice, upon precedent or custom, to an astounding degree. The realization that the action he is taking coincides with that which has been followed by others in similar circumstances bolsters his confidence, thus encouraging him to adhere to his course. As a generality, and subject to attack, it is a sound condition. It is Man's attempt to apply to the solution of his immediate problems the lessons of the past. It is itself a custom.

Customs which live and endure include those reasonable, consistent, universally accepted practices which make for a pleasanter life or more orderly procedures. Continued without interruption for a long period of time they become compulsory. They tend to take on the force of law, as indeed they are—the Common Law.

Oddly enough, the taboos or things to avoid doing, linger on much longer than the positive when the reasons for the existence of either are no longer perceptible. Man has little fear of challenging the positive, "This is the best way!" He finds somehow the courage to ask, "Why?" and failing to receive a sufficiently convincing answer to cast it aside. Not so with the taboo. That he continues to observe lest he be considered strange. From time immemorial it has been contrary to custom for an officer to walk under an umbrella. It is one of the most universally observed Army customs. Have you ever *seen* an officer walking under one? And can you state a reason? There is no known reason for it. It is a custom. It is a taboo.

Every established art, trade, or profession, every race of people, every nation, and even different sections of the same nation, have their own practices, their customs, by which they govern a part of their lives. Farmers exchange work and tools with their neighbors; but never grocers, or bankers, or manufacturers. At the Stock Exchange a nod of the head or the lift of a finger may convey the consummation of an agreement to buy or sell in enormous amounts, more binding than even a written agreement because repudiation would bar the offender from future trading. Doctors, statesmen, stone masons, carpenters, golfers, actors and all groups with a common interest follow traditions of their life and work. In each case observance of the customs identifies the newcomer as a member of the clan; non-observance sets him aside, and requires that he prove himself before being granted the privileges of acceptance. Fraternities, lodges, and secret societies of all kinds apply the usage by establishing closely guarded secrets and methods of recognition which, once disclosed by the newcomer, entitle him at once to the privileges of the order. Could a city dweller deceive a farmer as to his knowledge of the soil? Or the uninitiated of an order deceive a member? Customs develop unseen to supply needs because Man finds them useful to his purposes.

Army Customs. The army has its own customs. Some have been handed down from the distant past. Others are of comparatively recent origin. Those which persist stand on their own merits. They are unwritten in the sense that they are not embodied in official orders or regulations. Many Army customs complement procedures which are required by military courtesy, while others add to the graciousness of garrison life. The breach of some Army customs merely brands the offender as ignorant, or careless, or ill-bred; but there are others the violation of which would bring official censure or dis-

disciplinary action. To a certain extent they are included within the meaning of the "Customs of War," to be found in the oath of members of a court martial. The customs of the Army are its Common Law. Many of its usages are as firmly established as procedures which are prescribed officially.

Regimental Customs. In our Regular Army the regiment rather than the brigade or division has the historical background which facilitates the development of unit customs and traditions. The same is true of the National Guard and for the same reasons. Customs are becoming established in the new regiments which constitute the Organized Reserves. Customs have grown up in old and proud regiments which have been continued through the years, but which may be entirely unlike the customs followed elsewhere. Regimental customs tend toward the positive rather than the negative. Some of them are in celebration of an outstanding event in the history of the organization. Others are a traditional way of carrying out a desirable action which is unique to the regiment, but which may be done in other units in a different form. For example, some regiments have a very precise custom for the welcoming of a bride, or the formalities to be observed on Christmas Day with respect to the units of the regiment. It is in the interest of morale that regimental customs and traditions be fostered and scrupulously observed.

THE OFFICERS' CODE

Duty, Honor, Country. The code of Duty well performed, of Honor in all things, of Country above self is the unwritten, unspoken guide on which the official acts of officers of the entire Army are based. It springs from the United States Military Academy at West Point where it forms the foundation for the training of cadets. It is an all-inclusive code and a philosophy of living which serves as a goal and an ideal.

Sanctity of Official Statements. An officer's official word or statement is ordinarily accepted without question. The knowledge that a false official statement is not only a high crime, but is contrary to the ethics of the military profession, has placed personal and official responsibility for an official statement on a high level. It is punishable under the Articles of War.

Readiness for Increased Responsibility. The one certain thing about Army assignments is their infinite variety. The duty the officer may be called upon to do tomorrow may be far different from anything he has ever encountered. He must prepare himself specifically for the performance of the duties which pertain to the next higher grade. But the preparation which is more important is the increase in the scope and breadth of his capacity so that increasing responsibilities may not find him wanting. "Pygmies are pygmies still, though perched on Alps."

Personal Appearance Is High. It is a custom as well as a requirement that officers present a good appearance at all times. The officer must establish the example which the soldier is to follow. The respect and confidence of civilians in the officers of their Army is a vital necessity. The personal appearance of officers has a powerful influence in enhancing that feeling. The Army Regulations prescribe the method for achieving this end. Custom decrees that it be meticulously observed.

The Officer-Soldier Relationship. The officer strives to develop his organization to its maximum efficiency, while providing for his men an effective leadership, an impartial justice, a wise and fair attitude in every way. Those things which militate against this necessary result must be avoided. It is a psychological fact that undue familiarity breeds contempt. Officers and soldiers do not associate together in mutual social activities. No officer could violate this ancient custom with one or two men of his command and convince the others of his unswerving impartiality. The soldier does not need nor desire the social companionship of officers. He resents the "Hail-fellow-well-met" attitude, excessive paternalism, and perhaps above all else the use of the words, "My boys." He is a man in his own right, and entitled to be treated as such.

The civilian and the inexperienced cannot possibly understand this relationship, nor realize that it often develops into something far deeper and more valuable. Only those officers and soldiers who have endured together the gruelling hardships of long marches, of bitter campaigns, or the ordeals of battle can understand. Under those conditions

there often develops a mutual trust and complete confidence between officer and soldier in which each is carried forward to acts of sacrifice, of courage and leadership beyond themselves, to the end that the one shall not be seen as wanting in the eyes of the other. It may be the force which wins battles.

RANK HAS ITS PRIVILEGES (RHIP)

General. The military system bears some similarity to a hierarchy. Control is exercised by leaders placed in charge of units of the military structure. These leaders are officers and noncommissioned officers. A disciplined obedience combined with loyalty is required of all, from the highest to the lowest, in accordance with law and regulations. Subordinates are required to extend an unflinching respect to the authority which issues their orders. Personal admiration is a voluntary tribute to another which the military service does not demand. But the service does demand, and without equivocation, that respect for authority be manifested by unflinching courtesy to individuals who exercise it.

"I Wish" and "I Desire." When the commanding officer states, "I wish," or "I desire" rather than, "I order that you do so-and-so," this wish or desire has all the force of a direct order.

The Place of Honor. The place of honor is on the right. Accordingly, when a junior walks, rides, or sits with a senior he takes position abreast and to the left of the senior, except that a soldier accompanying an officer, both mounted, rides about one horse-length to the rear. The deference which a young man should pay to his elders pertains to this relationship. The junior should walk in step with the senior, step back and allow the senior to be the first to enter a door, and render similar acts of consideration and courtesy.

Use of Titles. Officers and noncommissioned officers are referred to by their full titles in official correspondence. In non-official correspondence and in conversation, brigadier generals, major generals, lieutenant generals, and generals are referred to and addressed as "General;" lieutenant colonels, under the same conditions, are referred to as "Colonel." Lieutenants should be addressed as "Mister" or "Doctor" (when appropriate) except when in the presence of enlisted men or in official correspondence in which cases the official title is used. Chaplains are addressed as "Chaplain" regardless of the grade attained. Catholic chaplains may be addressed as "Father." Warrant officers are addressed as "Mister" in all cases.

Senior officers frequently address juniors by name, as "Smith" or "Jones," but this address does not give the junior the privilege of addressing the senior in any other way than by his proper title.

Noncommissioned officers are always addressed by their titles; officers address them as "Sergeant," etc., notwithstanding their special warrants such as staff sergeant, master sergeant, etc.

Private soldiers are addressed by name, as "Smith."

Use of the Word "Sir." The word "Sir" is used in military conversation by the junior officer in addressing a senior, and by all soldiers in addressing officers. It precedes a report and a query; it follows the answer of a question. For example: "Sir, do you wish to see Sergeant Brown?" "Sir, I report as Old Officer of the Day." "Private Brown, Sir." "Thank you, Sir."

Seating at Mess. At regimental and post messes it is often the custom for officers to be seated according to rank, as in court martial. This is especially applicable at dinner, the formal meal. Officers should introduce their guests, before being seated, to the commanding officer or the senior officer present. Officers arriving late should apologize to the presiding officer for their tardiness. Other meals are informal.

Departing before the Commanding Officer. Officers should remain at a reception or social gathering until the commanding officer has departed.

New Year's Call on the Commanding Officer. It is an invariable custom throughout the Army that officers make a formal call upon the Commanding Officer during New Year's Day. The manner in which this call is made varies widely between regiments and stations, but it is always announced how it is to be arranged. In the usual case officers are accompanied by their wives when the call is made at the quarters of the

commanding officer. In some organizations the officers assemble at the quarters of the second-in-command, and all proceed in a body to make the call. At others the call is made informally during the afternoon. At large stations calls may likewise be made upon brigade and regimental commanders, in addition to the post commander, or upon the senior officer of each branch present for duty on the post, by the officers of the same branch.

Entering an Official Office. An enlisted man reporting to an officer in his office proceeds as follows: uncovers outside the door, unless under arms; knocks at the door; enters when told to do so; marches smartly to within two paces of the officers desk, halts, salutes, and makes his report: "Sir, Private Jones reports as directed," or whatever the report may be. Upon the completion of the conversation he steps back one step, salutes, executes about face, and leaves the office. A similar procedure is appropriate for an officer when making a formal or official report at the office of a senior.

Use of the Third Person. It is considered improper for officers to use the third person in conversation with their seniors. The form is often used in making an official report when the officer to whom the report is made does not know the officer reporting, such as an officer reporting for duty at a new station. In such a case the third person serves as an introduction, and is less awkward. However, some senior officers frown upon its use under any condition whatever.

Enlisted men make regular use of the third person when addressing officers. For example, "Private Brown has the permission of the first sergeant to speak to the company commander," or "Sir, does the captain wish to see Sergeant Snow?"

Permission of the First Sergeant. It is the custom that enlisted men secure permission from the first sergeant before speaking to the company commander. This usage is particularly applicable to requests of any kind. The custom is useful since many of the routine reports and requests which might otherwise reach the company commander can be handled as well by the first sergeant. It is essential to discipline that each soldier knows that he has the right to appeal direct to the captain for redress of wrongs.

THE NEWCOMER SHALL BE WELL RECEIVED

Reception of a Newly Joined Officer. It is a custom that newly joined officers shall be cordially received and many acts of courtesy extended to the officer and his family to make their arrival more pleasant and convenient. It is taken for granted that a newly joined officer knows his professional duties, and that he has every intention of performing them ably.

In the usual case the adjutant sends a letter of welcome to an officer under orders to join, informing him of local conditions which may be important or interesting for him to know before arrival. He will inquire as to the date and hour of arrival, whether traveling by automobile or train, and the number of persons accompanying him. If the arrival is by train an officer with transportation is at the station to meet him.

If quarters are available they should be made ready for immediate occupancy; if not available, steps should be taken to provide temporary accommodations at the Officers' Club or elsewhere.

The adjutant usually introduces the newly joined officer to the commanding officer, and at the first assembly to the other officers of the unit. He should also inform the newcomer as to local regulations and customs which he will need at once. A copy of the garrison regulations and a map of the post is especially useful to the stranger.

The officer and adult members of his family are usually accorded the courtesy of being in the receiving line at the first regimental function after his arrival.

Military Weddings. Military weddings follow the same procedures as any other except for additional customs which add to their color and tone.

All officers wear appropriate uniform and sabers. Frequently the national and regimental colors are crossed just above and behind the position of the chaplain.

The members of the bridal party line up on opposite sides of the aisle as usual, but upon the completion of the ceremony the groomsmen draw sabers and form an arch under which the bridal couple pass on their way from the church. In some cases this

arch is formed on the steps of the church. Sabers are returned after the bride and groom have completed the passage under the arch.

Reception of a Bride. It is a fine old Army custom that upon the marriage of an officer the bride and groom are received at the entrance of the post by an escort and conducted through the post to their quarters. There are variations between regiments in the details of execution. The escort usually consists of the regimental band, the officers of the regiment armed with sabers and mounted, in mounted services; appropriate official transportation, such as the caisson for an officer of artillery, is provided. The newly married couple is conducted around the post over a suitable route terminating at their quarters, the band playing appropriate airs. On arrival at the destination the bride and groom dismount and all officers present saber to the bride. When possible, the new home should be made ready for occupancy prior to their arrival by friends or members of the garrison.

The regimental band usually serenades the bride at a suitable time after her arrival on the post. All officers and adult members of their families call upon the bride as soon as she is established in her quarters.

It is customary for an appropriate gift to be purchased by the officers and ladies of the regiment for presentation to the bride. Many regiments follow the precedent of a standard piece of silver bearing the regimental coat of arms.

A few regiments hold an annual reception to honor brides who have come to the station within the past year.

Birth of a Child. When a child is born to the family of an officer the regimental commander sends a personal letter of congratulation to the parents on behalf of the regiment. In many regiments the child is presented with a silver cup with the coat of arms of the regiment and other suitable inscription engraved thereon.

The same procedure is appropriate for a child born to the family of an enlisted man except that the letter of congratulation is written by the organization commander, and the gift, if any is presented, would be from the soldier's company.

Upon request of parents it is usual that the regimental color is made available for christenings so that the child may receive the ceremony under the colors of the father's organization. For the ceremony of baptism both the national and regimental color may be made available.

Presentation of Recruits to Colors. In many regiments there is a ceremony held in which recruits are presented to the colors. The form varies but the purpose is to show the recruits that they are accepted and welcomed into the organization. The ceremony is held semi-annually, or according to local arrangements.

CUSTOMS IN CONNECTION WITH SICKNESS AND DEATH

Visiting the Sick. An officer who is sick in hospital is visited by the officers of the regiment in such numbers as may be permitted by the surgeon. An officer or soldier of his command visits him daily in order that his comfort or desires may receive attention.

An officer's wife who is sick in hospital receives flowers sent in the name of the officers and ladies of the regiment.

Death of an Officer or Member of His Family. When an officer of a regiment dies an officer is immediately designated by the commanding officer to render every possible assistance to the bereaved family. A similar courtesy may be tendered, if desired, in the case of a death of a member of an officer's family.

A letter of condolence is written by the regimental commander on behalf of the regiment. Flowers are sent in the name of the officers and ladies of the regiment.

Death of an Enlisted Man. When an enlisted man dies a letter of condolence is written to his nearest relative by the immediate commander of the deceased soldier.

Flowers sent in the name of members of the decedent's unit accompany the body.

The funeral is attended by all officers and men of the deceased soldier's unit, his battalion commander, the regimental band, and other members of the regiment who so desire and whose duties permit.

An appreciated custom of many regiments is the taking of pictures of the funeral procession and grave, if interment is in the post cemetery, to be forwarded to the soldier's next of kin.

SUPPORT OF REGIMENTAL AND POST ACTIVITIES

General. The regiment is a closely knit military unit around which are entwined official duties, athletic, social and cultural activities for the benefit of all. A member of a regiment becomes a member of an official family. An officer must do his full share in supporting and sponsoring the activities in which the regiment participates. His assignment means more than the place of performing his official duties, important as these may be; he will be expected to support and assist, at least by his presence, many events which form a part of regimental life. A proper spirit of pride in the regiment is a necessary factor in stimulating morale.

The Officers' Club. All stations have an Officers' Club. It may be elaborate and comfortable, or at the other extreme, as in a camp, it may be no more than a tent with a table and a few boxes to serve as chairs. The purpose remains the same to serve as a gathering place while off duty for officers of the unit. At many garrisons the club develops, sponsors, and finances facilities for sports such as golf, tennis, swimming, and riding. Regimental or garrison dances and other social gatherings are held. The Officers' Club forms the nucleus around which the regimental social life revolves.

The entire cost of maintaining the club and its activities is paid by the members on a pro rata basis. Some clubs have graduated membership rates according to rank, the junior officer paying less than the senior. It would be unheard of for an officer to fail to maintain a membership in the club of his regiment or garrison.

The Officers' Mess. The Officers' Mess is maintained for the convenience of the bachelor officers, officers visiting the post, and for the occasional use of other members of the regiment or garrison. At many stations the mess is operated as an adjunct of the club. The costs of operation are shared by those who utilize it on a basis satisfactory to all.

Attendance at Athletic Events Is Desirable. As a matter of policy to demonstrate an interest in regimental affairs, as well as for personal enjoyment, officers should attend athletic events in which regimental teams participate.

Ceremonies at Holiday Dinners. On Thanksgiving, Christmas, and New Year's Day all regiments have a tradition that the officers will visit the companies during the meal or prior to the serving of the meal. The method varies rather widely. As an example only, the regimental commander, his staff and field officers visit each mess hall just prior to the serving of the dinner. Officers of the company, their families, and families of married enlisted men of the company dine with the companies on these holidays.

Christmas Tree Entertainment. At Christmas an entertainment with a tree and presents for all children of the regiment is arranged by the chaplain. The band is present and appropriate ceremonies conducted. Funds for the purpose are raised by subscription.

At many stations members of the garrison join in singing carols after retreat or in the early evening. The band or orchestra leads the group, and carols are sung outside the hospital, before the quarters of the commanding officer, and at several places about the post.

The Regimental Band. The regimental band is an important factor in the maintenance of morale. It furnishes music for ceremonies, dances, at athletic events, concerts, and accompanies the regiment in many of its activities. When the band has finished playing for the particular enjoyment of the officers they should show their appreciation by expressing thanks to the band leader.

RELIEF FROM ASSIGNMENT

Farewell Tendered a Departing Officer. Prior to the departure of an officer from his regiment or station on change of assignment or upon retirement, a reception, 'despidida,' or other suitable regimental function is usually given by the officers and ladies in honor of the departing officer and his family. Often one of the regimental social functions is used for the purpose.

Retirement of an Enlisted Man. A regimental general order announcing the retirement of an enlisted man, commendatory of his services and containing a statement of his service, is published to the command. A battalion or regimental parade or review is held in his honor. At the termination of the ceremony the regimental commander in the name of the regiment, personally extends his good wishes to the soldier being retired.

The regimental band may serenade him before his departure from the post. A farewell dinner may be given in his honor. Frequently a farewell gift is presented as a memento of his last organization.

TABOOS

Uniform Must Not Be Defamed. The officer's uniform and his official or social position must not be defamed. Conduct which is unbecoming an officer and a gentleman is punishable under the 95th Article of War. The confidence of the nation in the integrity and high standards of conduct of the officers of the Army is an asset which no individual may be permitted to lower.

Proffer No Excuses. Never volunteer excuses or explain a shortcoming unless an explanation is required. The Army demands results. More damage than good is done by proffering unsought excuses.

Servility is Scorned. Servility, "bootlicking," and deliberate courting of favor are beneath the standard of conduct expected of officers, and any who openly practice such things earn the scorn of their associates.

"Old Man" to Be Spoken with Care. The commanding officer acquires the accolade, "The Old Man," by virtue of his position and without regard whatever to his age. When the term is used it is more often in approbation and admiration than otherwise. However, it is never used in the presence of the commanding officer, and if used would be considered disrespectful.

Avoid "Going over an Officer's Head." The jumping of an echelon of command is called "going over an officer's head." For example, a company commander making a request of the regimental commander concerning a matter which should first have been presented to the commander of his battalion. The act is contrary to military procedure and decidedly disrespectful.

Harsh Remarks Are to Be Avoided. The conveying of gossip, slander, harsh criticism, and fault finding are unofficerlike practices. In casual conversation it is wiser to follow this guide: "All the brothers are valiant, and all the sisters virtuous."

Excessive Indebtedness to Be Avoided. There are few offenses which injure the standing of an officer more than earning the reputation of being a poor credit risk. Officers are people, and they are subject to the same temptations and the same hazards of life as any other citizen. There are times when assumption of debt is unavoidable and necessary. Debts incurred must be liquidated. When circumstances intervene which prohibit the payment which is due, the officer should write or visit the creditor and make an arrangement which is mutually satisfactory. Some payment however small should be made at the time a payment is due; this protects the legal standing of the obligation and shows the intention to pay. The practice of permitting bills to accumulate with no attempt to pay, or to arrange a method of payment, is reprehensible and subject to official censure.

Officers enjoy an exceptional individual and group credit standing. It has been earned and deserved because of the scrupulous care officers have taken through the years to meet obligations when due. An individual who violates this custom brings discredit upon the entire officer group.

Never Lean on a Senior Officer's Desk. Avoid leaning or lolling against a senior officer's desk. It is resented by most officers and is unmilitary. Stand erect unless invited to be seated. Don't lean!

Never Keep Anyone Waiting. Report at once when notified to do so. Never keep anyone waiting unnecessarily. On the drill field when called by a senior officer, go to him at the double.

Avoid Having People Guess Your Name. Do not assume that an officer whom you have not seen nor heard from for a considerable period will know your name when a contact is renewed. Tell him at once who you are, and then renew the acquaintance. If this act of courtesy is unnecessary it will be received only as an act of thoughtfulness, while if it happens to be necessary it will save embarrassment. At official receptions always announce your name to the aide.

Baby Carriages, Bundles, and Umbrellas. There are longstanding Army taboos against an officer in uniform pushing a baby carriage, against carrying large and bulky bundles while in uniform on the street, and the carrying of an umbrella.

Smoking Is Objectionable at Times. Unless invited to do so, officers do not smoke in the office of the commanding officer. Many commanding officers prefer that officers refrain from smoking during an official visit or inspection. At West Point smoking by spectators during ceremonies is prohibited, and the custom is spreading through the Army generally.

Noncommissioned Officers not to Work on Fatigue. A custom which is said to be as old as the Army is that which exempts noncommissioned officers from performing manual labor while in charge of a fatigue detail or while on fatigue.

SOCIAL AMENITIES SHALL BE OBSERVED

General. All rules recognized in polite society are applicable to the Army Officer. Moreover, because of the close and intimate contacts which are inherent to garrison life it is important for the good of all that they be scrupulously observed.

FUNERALS

General. Military funerals are divided into three classes as follows:

(1) With chapel service, followed by march to the gate (or place of local disposition), with the prescribed escort.

(2) Without chapel service, but with funeral procession forming at the entrance to the cemetery or at a point within a reasonable marching distance therefrom.

(3) With graveside service only.

A full military funeral normally consists of the following elements:

(1) Band.

(2) Escort appropriate to the grade of the deceased, including firing party and bugler

(AR 600-30).

(3) Colors.

(4) Clergy.

(5) Caisson and casket bearers.

(6) Caparisoned horse (if the deceased was mounted).

(7) Honorary pallbearers.

The services of an Army chaplain will be provided unless otherwise requested by the family of the deceased or its representative. A civilian clergyman may be substituted for or act in conjunction with the Army chaplain. The desires of the family are paramount and will be given the fullest consideration as to the selection of elements involved, but the funeral will be conducted in accordance with these regulations.

The commanding officer or his representative will assist in making funeral arrangements and will supervise the conduct of the funeral.

The selection of honorary pallbearers, if they are desired, will be made by the family of the deceased, or its representatives, otherwise by the commanding officer.

At a military funeral, all persons in the military service in uniform or in civilian clothes, attending in their individual capacity, will stand at attention uncovered and hold the head-dress over the left breast at any time when the casket is being moved by the casket bearers and during services at the grave, including the firing of volleys and the sounding of *Taps*. During the prayers, they will also bow their heads. In cold or inclement weather, they will remain covered and execute the hand salute at any time when the casket is being moved by the casket bearers and during the firing of volleys and sounding of *Taps*.

Whenever arms are presented at a military funeral of a person entitled to personal honors, the prescribed ruffles and flourishes will be sounded, followed immediately by the *National Anthem (To the colors)* if only field music is present, or the march prescribed for the grade of the deceased, *except* where arms are presented at the close of the benediction at the grave.

The word "chapel" as used herein is interpreted to include the church, home, or other place where services are held, exclusive of the service at the grave.

The word "casket" is interpreted to include the receptacle containing the cremated remains of the deceased.

With Chapel Service. Prior to the beginning of the service, the funeral escort is formed in line opposite and facing the chapel, the band on the flank toward which it is to march.

Members of the immediate family, relatives, and friends of the deceased will be requested to enter the chapel and be seated before the casket is taken in. Members of the immediate family and relatives should occupy front seats on the right of the chapel.

The conveyance bearing the remains to the chapel should arrive in front of the chapel a few moments before the time set for the chapel service. When all is in readiness to move the casket into the chapel, the commander of the escort will bring the escort to *Attention* and command: 1. *Present*, 2. *ARMS*. At the command *Arms*, the band plays an appropriate air; the casket is removed from the conveyance by the casket bearers and carried between the ranks of honorary pallbearers, if present, into the chapel. When the casket has been carried into the chapel, the band ceases playing. The escort is then brought to the *Order* and may be permitted to stand at ease.

If honorary pallbearers are present they will be formed in two ranks (each facing the other) forming an aisle from the conveyance to the entrance of the chapel. At the first note of the music and while the casket is being borne between ranks of honorary pallbearers, they will stand at *Attention*, uncovered, and hold the headdress over the left breast. In cold or inclement weather, they will remain covered and will execute the *Hand salute*. They will then follow the casket in column of twos and occupy pews to the left front.

When the casket has been placed upon the church truck, the casket bearers will form behind the honorary pallbearers and be seated behind them to the left front of the chapel. If there are no honorary pallbearers, the casket bearers will follow the casket in a column of twos and be seated as indicated above. Upon completion of the chapel service, the casket bearers will follow the honorary pallbearers or, if none are present, the chaplain, to the entrance of the chapel.

Upon completion of the chapel service, the honorary pallbearers will follow the chaplain in column of twos as the casket is moved to the entrance of the chapel. They will again form an aisle from the entrance of the chapel to the caisson or hearse and proceed as prescribed above. When the casket has been placed on the caisson they will, if marching, form column of files on each side of the caisson, the leading member of each column opposite the front wheels of the caisson. If riding, they will enter their conveyance at this time.

The casket will be moved to the entrance immediately behind the honorary pallbearers and casket bearers followed by the family group. As soon as the honorary pallbearers have taken their positions, casket bearers will carry the casket to the caisson and form in column of twos behind it. The family group will remain at the chapel entrance until the honorary pallbearers have broken ranks to enter their conveyances or have taken their positions at the caisson. The family group will then be conducted to their conveyances.

The funeral escort and band will follow the procedure prescribed above when the casket appears at the entrance of the chapel at the conclusion of the service. The band will cease playing when the casket has been secured to the caisson.

The procession is then formed in the following order:

- (1) Band.
- (2) Escort, including colors, firing party, and bugler.
- (3) Clergy.
- (4) Caisson and honorary pallbearers, if walking.
- (5) Casket bearers.
- (6) Caparisoned horse, if the deceased was mounted.
- (7) Honorary pallbearers, if riding in cars.
- (8) Family.
- (9) Patriotic or fraternal organizations.
- (10) Friends.

When the procession has been formed, the band and the escort are put in march by the

commander of the escort. Elements in rear conform. The procession marches slowly to solemn music.

As the procession approaches the grave, marching elements march directly to positions previously determined. The band and military escort will be formed in line, facing the grave, other marching elements being placed as near as practicable to the grave. The firing party will be so placed that it will not fire directly over the mourners.

As soon as the caisson is halted, honorary pallbearers will be formed in two ranks, each facing the other, extending from the caisson toward the grave, with sufficient distance between ranks to permit passage of the casket. The casket bearers will remove the casket from the caisson, bear it between the lines of honorary pallbearers to the grave, and place the casket on the lowering device. They will remain in place facing the casket. They will raise the flag from the casket and hold it in a horizontal position, waist high, until the conclusion of *Taps*. The flag is then folded as prescribed in Army Regulations, care being taken that it does not touch the ground. It is then handed to the superintendent of the cemetery or his representative for disposition in accordance with Army Regulations. As soon as the casket, preceded by the chaplain and cemetery representative (or funeral director), has passed between the honorary pallbearers, they will face toward the grave and follow the casket in column of twos, followed by the family and friends. Upon arrival at the grave they will be formed in line in an appropriate position, facing the grave. When the grave is too near the road to permit the above formation, they will be directed to take their position at the grave prior to the removal of the casket from the caisson. Upon the removal of the casket from the caisson, they will remain covered but will uncover and remain uncovered until the conclusion of *Taps*. In cold or inclement weather, they will render the hand salute while the casket is being borne between their ranks and will again salute during the firing of musketry and the sounding of *Taps*.

As the casket bearers remove the casket from the caisson, the commander of the escort commands: 1. *Present*, 2. *ARMS*. At the command *Arms*, the band plays an appropriate air. When the casket has been placed over the grave the escort is brought to the order and the band ceases playing. The commander of the escort then commands: 1. *Parade*, 2. *REST*. The escort executes *Parade rest* with officers and men inclining their heads.

When the escort has been brought to *Parade rest*, the chaplain conducts the graveside service. At the conclusion of the benediction, he will move two steps to the side or rear.

When the service has been completed, the commander causes the escort to resume attention. He then commands: 1. *Escort, less firing party*, 2. *Present*, 3. *ARMS*, 4. *Firing party*, 5. *FIRE THREE VOLLEYS*. The firing party then fires three volleys of blank cartridges, assumes the position of *Ready*, and remains in this position until the conclusion of *Taps*. At the command *Arms* the bugler takes position at the head of the grave and sounds *Taps* immediately following the last volley.

At the conclusion of *Taps*, rifles of the firing party will be locked. The entire escort is then brought to the order. The band and escort are put in march in quick time by the commander of the escort. Other elements conform. The band will not play during the march from the grave. At the first halt, the rifles of the firing party are unloaded and inspected.

When the distance to the place of interment is considerable, the escort, after leaving the chapel, may march at ease in quick time until brought to attention in the vicinity of the grave. The band does not play while the escort is marching at ease. The field music may alternate with the band in playing.

Without Chapel Service but With Procession and Graveside Service. When the escort for a military funeral forms at or near the entrance to the cemetery, the officer in charge will supervise the transfer of the casket from the hearse to the caisson.

If honorary pallbearers are present, they will be formed in single line facing the caisson, the leading honorary pallbearers opposite the front wheel and on the side opposite to that on which the hearse is to be halted. If more than twelve are present they will form in double rank.

While the casket is being transferred from the hearse to the caisson, the escort is brought to *Present arms* and the band plays an appropriate air. The honorary pallbearers

uncover or salute. During the transfer of the casket, the family and friends remain in their conveyances.

The funeral procession is then formed and proceeds as previously prescribed.

Graveside Service. For this type of funeral all elements of a full military funeral, except the caisson and caparisoned horse, may be present and used. If, however, troops are not conveniently available or the family desires to eliminate other elements, the following will suffice:

- (1) Clergy.
- (2) Casket bearers.
- (3) Firing party.
- (4) Bugler.

All military elements participating in a graveside service will be in position prior to the arrival of the remains.

Cremated Remains. In cases where the remains are cremated and the ashes interred with military honors, necessary modifications will govern.

For all phases of the funeral where the cremated remains are carried by hand, one enlisted man will be detailed to carry the receptacle containing the ashes. Four enlisted men will also be detailed as flag bearers. When the receptacle containing the ashes is carried from the conveyance into the chapel, from the chapel to the conveyance or conveyance to the grave, the flag bearers will follow the receptacle, the flag being folded as prescribed in paragraph 2 g, AR 260-10, and carried by the leading flag bearer on the right.

When the receptacle has been placed on the stand before the chancel of the chapel or when placed in the conveyance, the flag will be folded and placed beside the receptacle. If the caisson is equipped with a casket container for the receptacle, the open flag will be laid upon the container as prescribed for a casket, otherwise the flag will be carried, folded as prescribed, by the active flag bearers.

When no hearse or caisson is used, suitable transportation will be provided for the receptacle bearer and the flag bearers.

In cases where the remains are conducted to a crematory and the ashes are to be interred with military honors at a later time, the ceremony will consist only of the escort to the crematory. Arms will be presented as the remains are borne into the crematory. The firing of volleys and sounding of *Taps* are omitted. In case the funeral ceremony is held at the crematory and no further military honors are anticipated, the volleys may be fired and *Taps* sounded at the discretion of the commanding officer and dependent upon local conditions.

Ceremony Prior to Shipment of Remains. In cases where the remains of a deceased officer or soldier are moved to a railway station or other point for shipment to a distant place for interment or final disposition, funeral services, modified as necessary, may be carried out. If no further military honors are anticipated at the place of interment or final disposition, the volleys of musketry may be fired and *Taps* sounded at the discretion of the commanding officer and dependent upon local conditions. If military honors are anticipated at the place of final disposition, the firing of volleys and sounding of *Taps* will be omitted.

Cannon Salute. When the funeral of an officer on the active or retired list who was entitled to a salute takes place at or near a military post, minute guns will be fired while the remains are being borne to the place of interment (or place of local disposition). The first gun will be fired immediately after the procession is put in motion.

Immediately after the remains have been lowered into the grave (upon completion of the benediction) a salute corresponding to the rank of the deceased (as prescribed in Army Regulations) will be fired, followed by three salvos of artillery, guns firing simultaneously, or three volleys of musketry.

Participation of Aviation. When aviation participates in a military funeral, the participation will be so timed that planes will appear over the procession while the remains are being borne to the grave.

Participation of Fraternal or Patriotic Organizations. At the request of the immediate family of the deceased, or its representative, fraternal or military organizations of which the deceased was a member may be permitted to take part in the funeral services.

If the ritual is military or semimilitary in nature, the rites will begin immediately upon the conclusion of the Army religious service. If the ritual contains the firing of three volleys of musketry and the sounding of *Taps*, the military firing party and bugler may be used. This sounding of *Taps* will conclude the funeral services.

Nonmilitary rituals by fraternal organizations will be held at the conclusion of *Taps*. The military escort will be marched away from the site of the grave promptly and quietly at the termination of the military ceremonies.

Duties of the Chaplain. The chaplain will take position in front of the chapel prior to the arrival of the remains. He will precede the casket when it is borne into the chapel and again while the casket is borne from the chapel to the caisson or hearse. While the remains are being placed on the caisson or in the hearse, he will stand uncovered at the rear and to the side facing the caisson or hearse. When the casket has been secured, he will take his position in front of the caisson or hearse. In the event that the chaplain is wearing vestments, he may, at his discretion, proceed directly from the chapel to the sacristy at the conclusion of the service and devest, joining the procession just prior to its movement from the chapel. When the procession is formed at the entrance to the cemetery or other point and the chapel service is omitted, he will take a similar position near the caisson while the remains are being transferred from the hearse to the caisson. If riding, his conveyance will be placed in position in front of the caisson or hearse. In cold or inclement weather, the chaplain may remain covered except when reading such parts of the service as require that he be uncovered.

Preliminary Arrangements. The officer detailed in charge of a military funeral, accompanied by the commander of the escort and the superintendent of the cemetery or his representative, will visit the places involved and make careful arrangements prior to the time set for the funeral. Positions at the grave to be occupied by various elements of the funeral, arrangements for traffic control, etc., will be definitely determined.

Floral Tributes. In the absence of a funeral director, the officer in charge, assisted by the chaplain and such details as may be required, will cause all floral tributes to be properly arranged in the chapel and at the grave. He will call upon the commanding officer for necessary transportation for the prompt transfer of floral tributes from the chapel to the grave. The conveyance bearing floral tributes will be loaded promptly at the conclusion of the chapel service and will precede the funeral procession, moving as rapidly as practicable to the site of the grave. The funeral procession will not move from the chapel until the conveyance carrying floral tributes has cleared the escort.

The officer in charge will be responsible that cards are removed and a record made giving a brief description of the floral piece pertaining to each card. The cards and record will be turned over to a member of the family of the deceased after completion of the funeral services.

CHAPTER XV

BALLISTICS AND PROJECTILES

Introduction. The purpose of this chapter is to present a digest of many of the essentials of ballistics, projectiles, and the effects of fires in producing casualties. The medical officer needs an understanding of the nature of the machines which cause injuries in order that he may provide for their proper treatment. He requires an understanding of the characteristics of the fires delivered by the many weapons in use in order that he may protect his own personnel and the wounded from unnecessary exposure which might result in additional casualties.

Ballistics. Ballistics is the science which treats of the flight of projectiles discharged from firearms. Interior ballistics deals with the flight of the projectile within the barrel of the weapon from the starting point until it leaves the muzzle. A projectile reaches its maximum initial velocity (muzzle velocity) just beyond the muzzle. Exterior ballistics deals with the flight of the projectile from the muzzle of the gun to its striking point.

As soon as the powder charge of the propellant is ignited, gas is given off and the

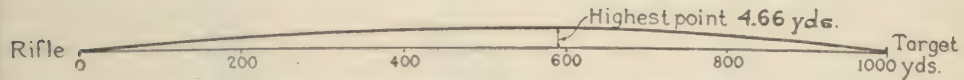


Plate 1. Trajectory for 1000 Yards, Model 1906 Ammunition.

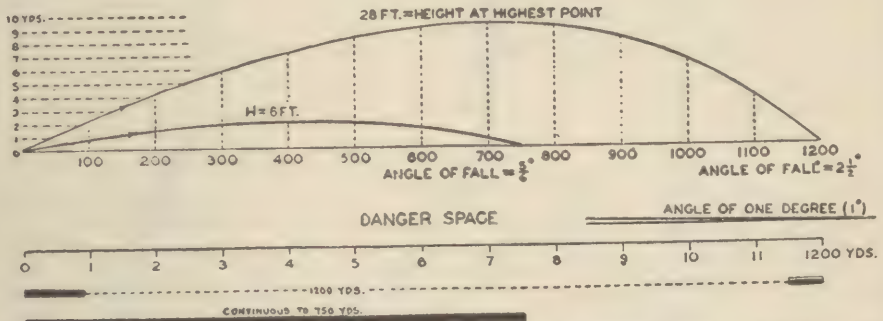


FIGURE 1. —Trajectory diagram for the cartridge, ball, caliber .30, M1906 (vertical scale is 20 times the horizontal scale).

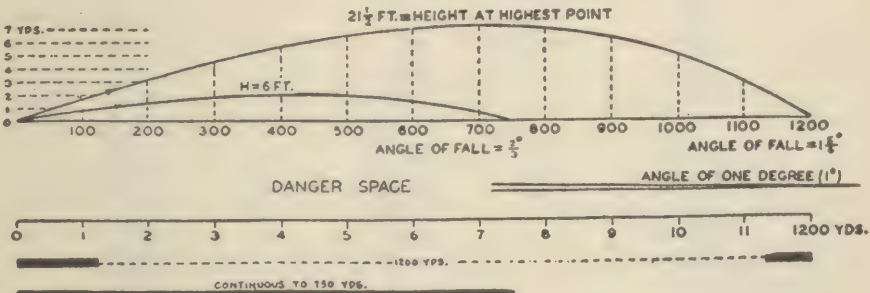


FIGURE 2. —Trajectory diagram for the cartridge, ball, caliber .30, M1 (vertical scale is 20 times horizontal scale).

Plate 2. Trajectory Diagrams.

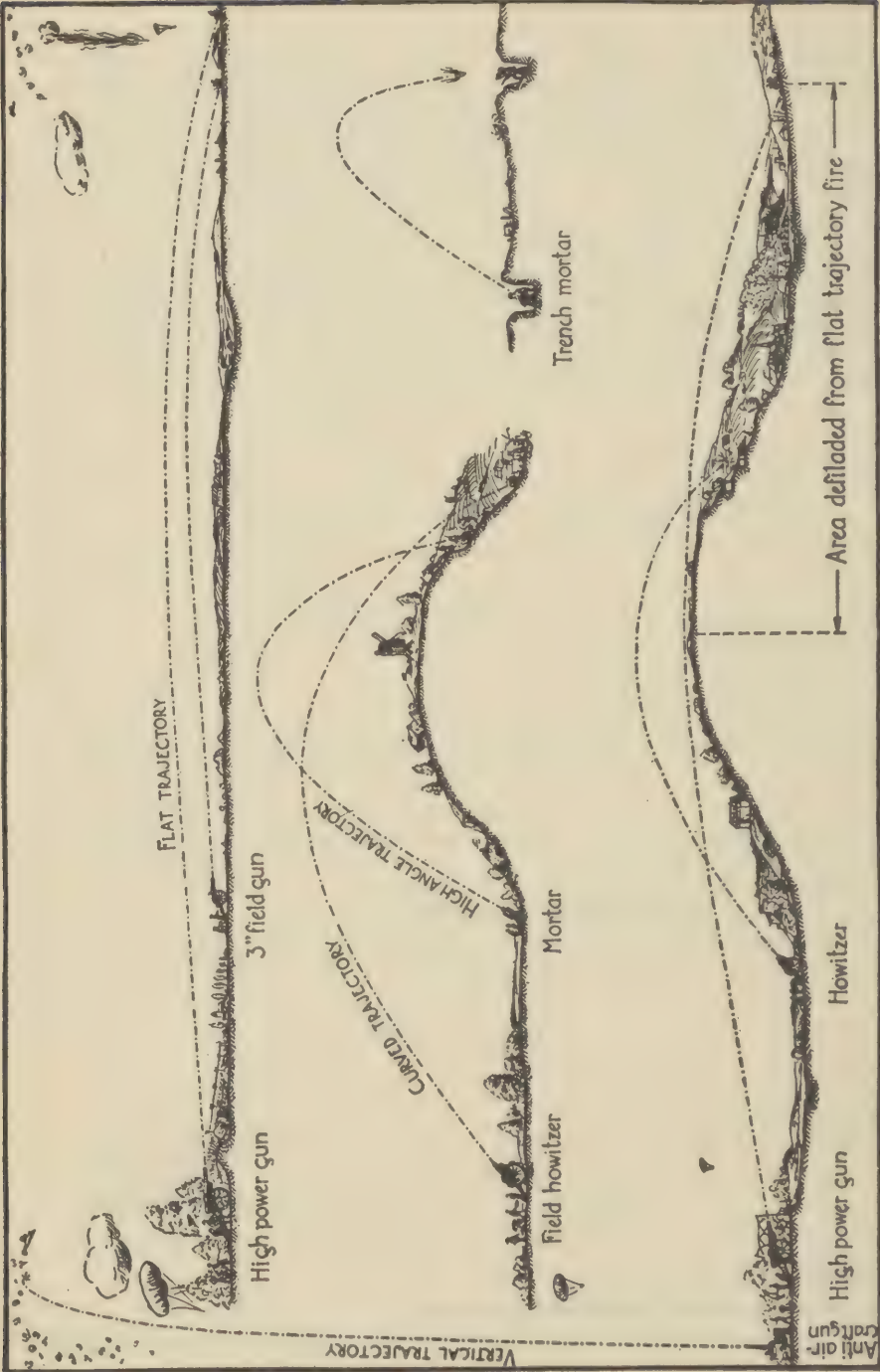


Plate 3. Trajectories of Guns, Howitzers, and Mortars.

chamber pressure increases enormously. The force of this gas drives the projectile through the barrel. The interior of the barrel contains "rifling" (spiral lands and grooves), the interior diameter being somewhat less than the maximum diameter of the projectile. When the pressure in the chamber is high enough to overcome the shearing resistance of the copper rotating band, in the case of artillery ammunition, or of the relatively soft metal of a rifle bullet, the projectile moves forward, sealing the bore to retain the force of the expanding gases and engraving the rifling upon the rotating band or the projectile itself. Thus the expanding gases impart the forward motion, and the rifling imparts a spin to the projectile; these factors prevent tumbling and hold the projectile true in flight.

At the time the projectile leaves the muzzle, that is to say, when the projectile enters the field of exterior ballistics, it is acted upon at once by the force of gravity and the effects of air resistance. The effect of gravity is to curve the projectile downward, to retard its flight during the upward movement, and to accelerate it during the descent. The effect of air resistance is material and complicated. For the immediate purpose of this discussion, a wind from the side will deflect the bullet in its trajectory; further, the reaction of the air sets up a drag incident to the creation of a vacuum at the base of the projectile while in flight. Improvements in the design of projectiles, as in the M1 or "boattail" rifle ammunition, reduce the extent of this drag which causes material changes in the characteristics of the fire with respect to the range, which is increased, and the maximum ordinate while in flight, which is reduced.

Trajectory. The trajectory is the curved path followed by the bullet in its flight through the air. Because of its great speed the trajectory of rifle or machine-gun fire at short ranges is nearly flat, the bullet flying in almost a straight line from the muzzle of the gun to the target. The height of the trajectory increases and rises above the line of aim as the range increases. Plate 1 shows the trajectory of a rifle bullet for a range of 1000 yards; it will be noted that the projectile rises to a height of only 14 feet above the line of aim. Trajectory diagrams for the rifle and other weapons are further illustrated in Plates 2 and 3.

The vertical height of the trajectory above the horizontal plane, at any point, is known as the *ordinate*, and the greatest height at the summit of the trajectory is called the *maximum ordinate*.

Danger Space. Since the trajectory of a rifle bullet for a range of 750 yards does not rise above the height of a man standing (68 inches), it follows that on level or uniformly sloping ground all the space between gun and target is endangered. Thus, the *danger space* for ranges up to 750 yards is continuous. (See Figure 1, Plate 4.) For ranges of 800 yards or more the bullet does rise above the height of a man. For such ranges the danger space consists of two parts; first, the space from the rifle to the point at which the bullet rises above the height of a man; and second, the space from the point where it again falls within the height of a man to the target. (See Figure 2, Plate 4) This characteristic of the trajectory enables machine guns to deliver supporting fires (overhead fire) in support of troops in the line of fire in advance of the gun positions, within the limits established by safety angles which are prescribed in fire control tables.

Dispersion. Experience has shown that bullets fired from a firearm do not follow exactly the same path. (See Plate 5) Due to minute differences in ammunition, aiming, holding, and atmospheric conditions the bullets scatter slightly. This effect is called *dispersion*, and the trajectories of those bullets form an imaginary cone-shaped figure, with its apex at the muzzle, called the *cone of dispersion*. This characteristic is applied in firing against hostile aviation since the dispersion compensates for minor errors in aim.

Shot Groups. When the cone of dispersion strikes a vertical target it makes a pattern upon it called a *vertical shot group*. (See Plate 6) The pattern made on a horizontal target or surface is called a *horizontal shot group*. Hits are not distributed evenly over the entire pattern but are much closer together near the center. Vertical shot groups are oval shaped while horizontal shot groups take the form of a long, narrow ellipse.

Beaten Zone. The ground struck by the bullets forming a cone of dispersion is called the *beaten zone*. Where the ground is level, the beaten zone is also a horizontal shot group. The slope of the ground has great effect on the size and shape of the beaten zone. (See Plates 4 and 7.)

FIG.1 CONTINUOUS DANGER SPACE

At short range the height of the trajectory never exceeds that of a man

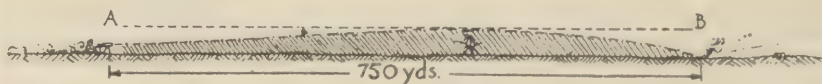


FIG.2 SHORT DANGER SPACE AND LONG SAFETY SPACE IN LONG RANGE FIRE

Between A and B the bullet is always higher than a man's head



FIG.3 DANGER SPACES OF TRAJECTORY AND RICOCHET

At A occurs the "first catch" by lowest part of cone of fire. At B occurs the "first graze". At short and medium ranges, where trajectory is flat, there is an indefinite danger space beyond C, due to ricochet depending on the direction and remaining velocity of the ricochet bullets



SHEAF OF FIRE, BEATEN ZONES AND DANGER SPACES AT SHORT AND AT LONG RANGES

FIG.4 SHORT RANGE



FIG.5 LONG RANGE

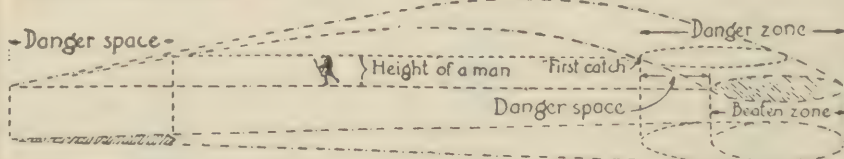


Plate 4. Danger Space, Beaten Zone, and Danger Zone of Rifle Fire.

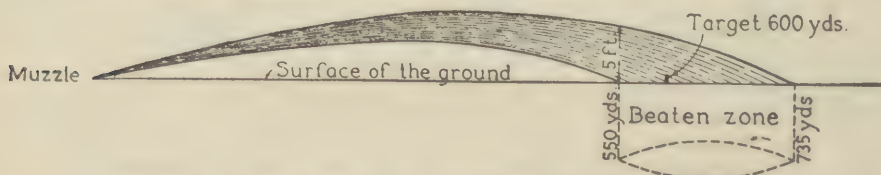


Plate 5. Cone of Fire or Dispersion and Beaten Zone.

Danger Zone. An enemy is in danger when he is in the beaten zone or in the corresponding danger space. Where bullets strike the ground at an acute angle they *ricochet* (glance up in the air); this results in additional danger space. The *danger zone* is comprised of all the danger spaces mentioned above. (See Plate 4)

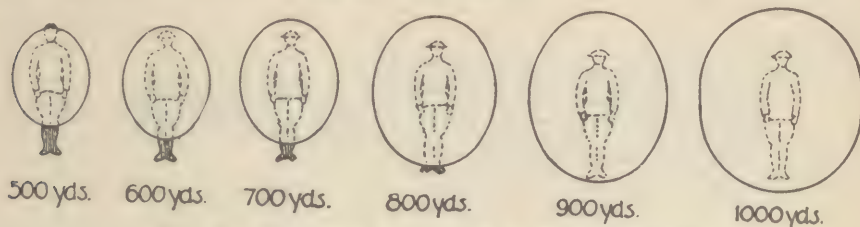


Plate 6. Vertical Shot Groups at Various Ranges.

Defilade. In the presence of an enemy, troops seek areas for stationary installations and as avenues of advance or retirement which are protected from enemy fire. These areas are provided by ground forms such as intervening hill masses, valleys, minor irregularities in the surface of the ground, and trenches. If they cannot be reached by the flat-trajectory

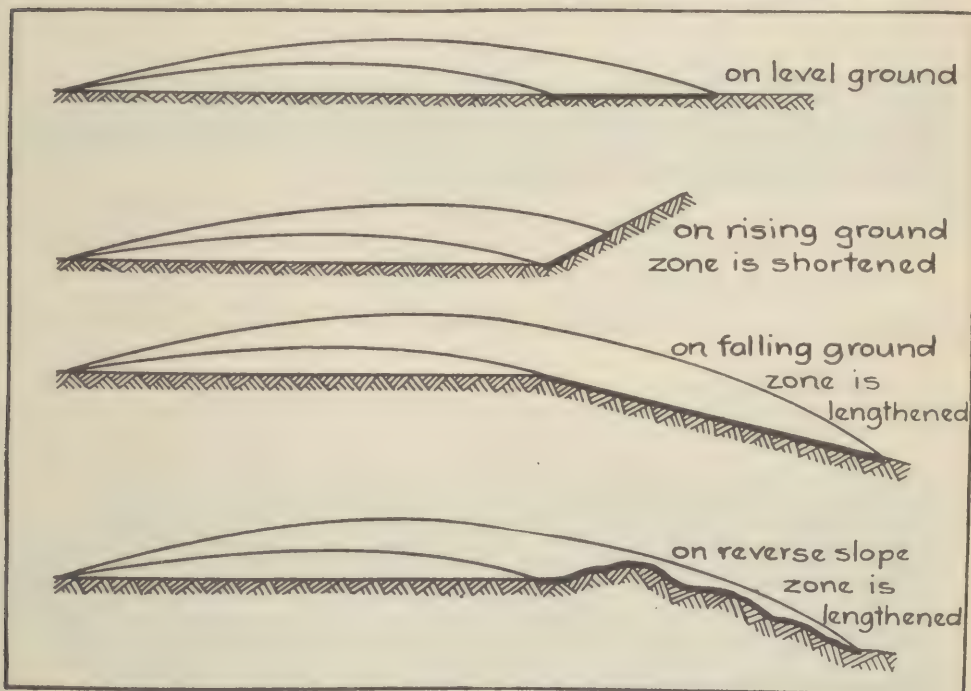


Plate 7. Effect of Ground Slopes on Beaten Zone.

weapons of the enemy, such as rifles, machine guns and light artillery, they are said to be in *defilade*. It is impossible to secure defilade from high-trajectory weapons such as the 81-mm mortar because its projectile may fall at right angles to the surface of the ground. Overhead protection must be obtained to escape the effect of such fires. Mere concealment on a reverse slope may not provide defilade since the curve of the trajectory may permit the fire to sweep and search such slopes. (See Plates 3 and 7.)

Projectiles. Casualty producing projectiles include bullets fired from small arms (rifles and caliber .30 machine guns), infantry mortars, antitank guns, chemical mortars, and artillery projectiles such as shrapnel, high explosive shell, and chemical shell. Armor-piercing projectiles are designed to penetrate protective armor, such as tank armor, in order to cause casualties within the vehicle. (See Plates 8, 9, and 10.)

High Explosive Shell. High explosive shell is a cylinder of iron and steel with a conical head. The projectile has thick walls, and the hollow core is filled with an explosive charge which is detonated by means of a time fuse or percussion cap that explodes on contact.

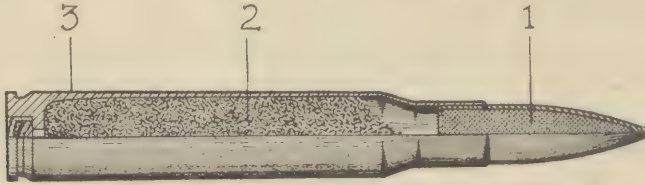


Plate 8. The Rifle and Machine Gun Cartridge, Caliber .30.

Legend: 1. Bullet; 2. Propelling charge; 3. Cartridge case.

The casing is ruptured and fragmented, and each individual fragment becomes in itself a projectile capable of inflicting serious lacerated wounds, owing to the jagged shape of the individual pieces. These fragments vary in weight from a few grains to as much as 150 pounds. Light artillery shells weigh approximately 15 pounds; heavy artillery shells weigh as much as a ton.

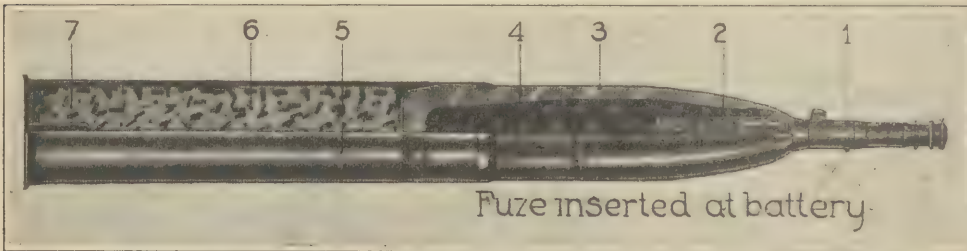


Plate 9. An Assembled Round of 75-mm High Explosive Ammunition.

Legend: 1. Fuze, point detonating Mk. III; 2. Adapter and Booster, Mk. III-B; 3. High Explosive Shell, Mk. IV; 4. Bursting charge TNT; 5. Cartridge case; 6. Propelling charge; 7. 49-grain primer, Mk. I.

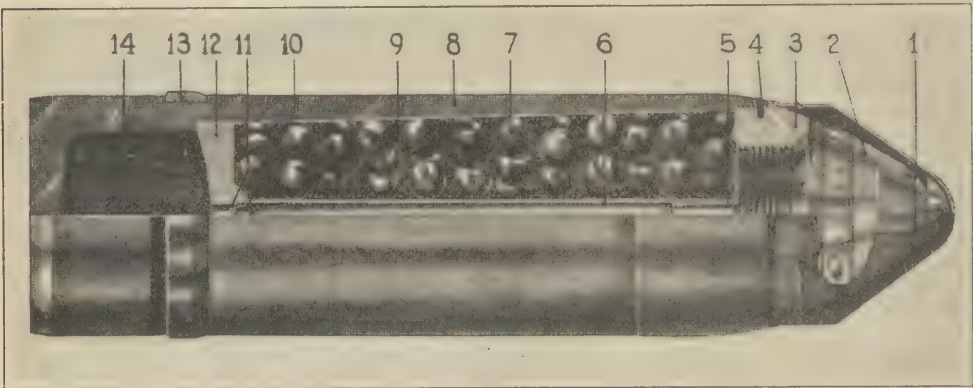


Plate 10. Projectile Only, 75-mm Shrapnel.

Legend: 1. Waterproof cover; 2. 21-second combination fuze; 3. Head; 4. Inner tube; 5. Bourrelet; 6. Central tube; 7. Balls; 8. Case; 9. Matrix (resin); 10. Fiber paper cup; 11. Cloth disk; 12. Diaphragm; 13. Rotating band; 14. Base charge (loose black powder).

Shrapnel. Shrapnel consists of a cylinder of steel which contains a varying number of round lead bullets approximately .5 inch in diameter. The bursting charge in the base is exploded by means of a time fuse in the head. The usual employment of this fire is to obtain an air burst above the ground and on the near side of the target. At the time of bursting, the lead balls are driven out in the form of a cone. In effect, shrapnel is a flying

shotgun. The case itself does not undergo much fragmentation, but each individual bullet, as well as the time fuse and the casing, becomes a separate projectile. Shrapnel is especially useful for employment against exposed personnel.

Chemical Shell. Chemical shells obtain their name from the nature of the filler. The filler may be a lethal gas or a smoke compound. When the shell bursts, the chemical filler produces a gas or smoke cloud, in contradistinction to the effect of high explosive shell which depends upon the blast of explosion and the fragmentation of the shell body. Smoke shells are used to deny observation to an enemy; the smoke itself is not a casualty producing agent.

Bombs. Bombs dropped from airplanes in flight include fragmentation, demolition, and chemical bombs. High explosive is the most common load as it is effective in demolitions as well as in producing casualties. Airplanes are able to carry bombs which weigh as much as two tons.

Bursting Radius. The radius measured from the point of impact or detonation of a bursting projectile and including the zone within which casualties are almost certain to be produced is called the *bursting radius*. It varies in size in accordance with the nature of the shell, the kind and quantity of the charge, and the slope of the ground.

Fire Superiority. Fire superiority is the condition obtained by delivering such an effective fire against an enemy that his own fires are greatly reduced in accuracy and volume. In its utmost application it causes the enemy to forget all else save self-preservation. It must be obtained before troops can advance upon an enemy position except at the cost of heavy casualties. It is a moral phenomenon and purely relative. It is obtained as a result of accuracy, proper distribution over the entire area occupied by an enemy capable of holding up an advance, and great volume. Against inferior troops the condition may be obtained with relative ease. Once established it must be maintained for without it an attack will be stopped or the defense will be overwhelmed.

Effect of Rifle Fire. The bulk of rifle fire is delivered at ranges within 600 yards, although selected men may open fire at longer ranges. In the defense where good observation and long fields of fire are available, fire may be opened at ranges as great as 1000 yards. Machine guns fire at much greater ranges because of their volume of fire and the fixed mount (tripod), as well as their capacity for delivery of fire by indirect laying at invisible targets. At a range of 2500 yards a rifle bullet has enough force to disable a man.

Rifle fire has both physical and moral effects. Properly placed, fire produces casualties and may cause the enemy to remain under cover. At ordinary ranges the sound of a bullet passing within a few yards is a sharp, frightening crack. Bullets which fall a little short kick up a shower of dirt and stones and ricochet with a loud, disconcerting whine. Thus, while hits are desirable, shots that come close to the target have considerable effect. The enemy is afraid to stick his head up long enough to take careful aim. He may become excited, unable to think clearly, or to act with coolness. These factors are worthy of consideration during the training process of all troops whose missions take them within the combat zone since this knowledge will serve to increase confidence and overcome many human fears.

Effect of Artillery Fire. Artillery projectiles cause the bulk of battle casualties. It is accurate, it may be delivered with surprise effect at long range, and may be massed in great volume to strike within a limited area. It may be used to destroy material objectives. Because of the high trajectory of mortars and howitzers they can place their projectiles in areas which are in defile from flat-trajectory weapons.

Against troops in dense formation the casualty effect of even a single shell is material because of the extent of its effective bursting radius. The force of detonation of high explosive shell may cause casualties without hits by shell fragment. The moral effect of artillery fire is especially serious.

A.E.F. Battle Casualties by Arm and Service. The statistics recorded below indicate by arm and service the rate per thousand and the absolute numbers of killed and wounded in the American Expeditionary Force.¹

¹ Medical Department of the United States in the World War, Vol. XV, Statistics, Part 2, Medical and Casualty Statistics.

Branch	Rate Per Thousand	Absolute Numbers
Infantry	583.96	229,223
Signal Corps	101.74	2,128
Tank Corps	100.44	454
Field Artillery	73.11	11,146
Corps of Engineers	59.24	8,456
Medical Department	51.62	3,954
Quartermaster Corps	18.81	2,136
Cavalry	17.81	96
Air Corps	13.64	685
Ordnance	10.36	113
Others	30.29	2,392
Total		260,783

Classification of Death-producing Agents. Of the 50,385 deaths in the AEF classified as killed in action or died of wounds, the following table indicates the agent causing the casualty by percentages.

Gun-shot missiles, shrapnel, or shell, kind not stated	81.53%
Rifle and machine gun	7.02%
Mustard gas	4.38%
Other gases	4.47%
Others	2.60%

Part II

Medical Subjects

CHAPTER I

MEDICO-MILITARY HISTORY

EVOLUTION OF THE MEDICAL DEPARTMENT, U. S. ARMY

The Medical Department of the United States Army had its origin at the very beginning of our national history. In 1775, upon the recommendation of General George Washington, the Congress created the first military-medical service known in America. At this early period each of the widely separated forces was provided with its own medical service. There was no central medical organization. However, there was created the position of Director General and Chief Physician, the first appointee being Dr. Benjamin Church of Boston.

The evolution of the Medical Department into its present form has been based upon necessity and upon the constantly increasing need for its growth and development. The periods of greatest development correspond to the major military and political vicissitudes of the United States government. There are, however, two distinct basic eras: the period prior to central organization which occurred in 1818 when General Joseph Lovell became the first Surgeon General; the period of development since that time.

THE SURGEONS GENERAL OF THE U. S. ARMY

Chiefs of the Medical Department (1775-1940)

- 1775-1775—Benjamin Church, Director General and Chief Physician of the Hospital of the Army.
1775-1777—John Morgan, Director General and Physician in Chief of the American Hospital.
1777-1781—William Shippen, Jr., Director General of the Military Hospitals of the Continental Army.
1781-1783—John Cochran, Director General of the Military Hospitals of the Continental Army.
1792-1796—Richard Allison, Surgeon of the Legion.
1798-1800—James Craik, Physician General.
1813-1814—James Tilton, Physician and Surgeon General.
1818-1836—Joseph Lovell, Surgeon General.
1836-1861—Thomas Lawson, Surgeon General.
1861-1862—Clement Alexander Finley, Surgeon General.
1862-1864—William Alexander Hammond, Brigadier General, Surgeon General.
1864-1882—Joseph K. Barnes, Brigadier General, Surgeon General.
1882-1883—Charles Henry Crane, Brigadier General, Surgeon General.
1883-1886—Robert Murray, Brigadier General, Surgeon General.
1886-1890—John Moore, Brigadier General, Surgeon General.
1890-1890—Jedediah Hyde Baxter, Brigadier General, Surgeon General.
1890-1893—Charles Sutherland, Brigadier General, Surgeon General.
1893-1902—George Miller Sternberg, Brigadier General, Surgeon General.
1902-1902—William Henry Forwood, Brigadier General, Surgeon General.
1902-1909—Robert Maitland O'Reilly, Brigadier General, Surgeon General.
1909-1913—George H. Torney, Brigadier General, Surgeon General.
1914-1918—William Crawford Gorgas, Brigadier General and Major General, Surgeon General.
1918-1931—Merritte Weber Ireland, Major General, The Surgeon General.
1931-1935—Robert Urie Patterson, Major General, The Surgeon General.
1935-1939—Charles Ransom Reynolds, Major General, The Surgeon General.
1939— —James Carre Magee, Major General, The Surgeon General.
-

The Medical Department remained loosely organized until the appointment of General Lovell as Surgeon General. For a time during the Revolution there was a semblance of centralization which was briefly revived during the war scare of 1798 and during the War of 1812. But as a regular procedure each regiment or post attended to its own medical affairs. Medical progress remained slow and uncertain with this lack of common interest and a considerable ignorance of preventive measures against contagious diseases. Nevertheless, during this period of disorganization, the amplified mistakes gave loud warnings which guided the medical service toward central organization. The results have been of benefit not only to the Army but to the health and economic progress of the nation as well. Perhaps it was in realization of the suffering and hardships of the American soldier in peace as well as war that Congress, in 1818, passed the bill which provided a Medical Department for the Army, appointed a Surgeon General, and set up a central organization. This basic framework has been continued and exists today.

This chapter records a chronological summary of many of the important and interesting developments, changes, activities, and achievements of the Medical Department and its members. They are listed according to period and exact date so far as possible. In addition, a very few of the major achievements of the department are discussed in some detail.

ERA PRIOR TO CENTRAL ORGANIZATION

1775-1812. THE PERIOD FROM THE REVOLUTIONARY WAR TO THE WAR OF 1812

1775

July 1. The Provincial Congress of Massachusetts, after the Battle of Bunker Hill and the use of several large homes as hospitals, fixed the medical personnel in two classes: for a hospital, two surgeons and two surgeon's mates; for a regiment, one surgeon and two surgeon's mates.

July 27. The Congress provided for the establishment of "an Hospital" for an army of 20,000 men. The need for this medical service was foreseen by General Washington soon after his initial inspections, and he recommended it in writing on July 21.

1776

The Army made the first request for women to care for the wounded. Wives, mothers, and sisters of the soldiers were used on the basis of one per each ten soldiers sick.

The equivalent of the present Hospital Fund was established by John Morgan, M.D., Director General and Physician-in-Chief of the Continental Army. With the counsel of General George Washington, and the assistance of regimental surgeons, he drafted the first hospital regulations for the American Army.

Dr. John Jones included in his book, which was the first American book on surgery, a chapter on camp and military hospitals.

The Continental Army retreated from Quebec, during which there was a smallpox epidemic. While orders forbade the use of inoculations, the soldiers themselves commonly put it into practice by self-administration.

1777

Benjamin Rush, a famed medical man of the Revolutionary period, published a pamphlet on the hygiene of troops entitled *Directions for Preserving the Health of Soldiers*.

Dr. William Shippen, Jr., Director General of the Military Hospitals of the Continental Army, drew up a plan for "flying" ambulances. These chariot-like ambulances were used to bring the doctors to the patients in the field rather than to bring the patient to the doctor.

Authority was granted to Director General William Shippen, Jr., and his deputies to utilize the services of surgeons, either in the hospital or with the regiments, as circumstances indicated.

1778

A resolution was passed by Congress to fine each officer who entered a hospital for the cure of venereal disease ten dollars; similarly, soldiers were fined four dollars. The money thus obtained was used for the purchase of blankets and shirts for soldiers who were sick in the hospitals. The results are unknown.

The medical administration was divided among three large territorial departments: Northern, Middle, and Eastern. Each department was authorized a "Physician and Surgeon of the Army," a "Physician General," a "Surgeon General," and a "Deputy Director General." Appointments were made for all positions except the "Deputy Director General" of the Middle Department.

The earliest pharmacopoeia for use of the Continental Army was prepared by Dr. William Brown, who was Physician General of the Middle Department. It was the first American pharmacopoeia.

1780

The first Army regulations were written. They contained a chapter on "Treatment of the Sick." This chapter was helpful and gave information which would still be considered as good common sense.

James Tilton, later Physician and Surgeon General, introduced log huts as hospitals. Most of the suffering of the sick was due to exposure.

1781

February. Congress appointed a Secretary of War, and medical reports heretofore sent to the Medical Committee of Congress were sent to him. Prior to this time, medical affairs had been regulated through the Medical Committee, which had been permitted to visit and inspect the hospitals and to make necessary investigations of the medical administration.

1784

June. All troops were discharged except 700. One surgeon and four surgeon's mates were retained to provide medical care for the Army.

1788

The number of troops in service was 595, most of whom were stationed on the western frontier. The medical officers were appointed by the States from which the troops were received.

1789

August 7. The War Department was organized as an executive department, four months after the inauguration of General Washington as President.

1790

The Regular Army was organized with a strength of 1216 enlisted men and a small number of officers. Three years was the length of service for both rank and file. The President was authorized to engage extra surgeon's mates as he deemed necessary.

1792

An Act of Congress reorganized the Army as a "Legion" under command of a major general and further divided it into four sub-legions, each commanded by a brigadier general. The chief medical officer on the staff of the major general commanding the "Legion" was titled "Surgeon of the Legion." Richard Allison was the first appointee to this position. Each sub-legion was authorized a surgeon and three surgeon's mates. While this law remained in effect for over a century, and was the only "militia law" during this period, it was never fully carried into effect.

1790-1798

The Army was increased by numerous additions to the strength of the regiments. Medical officers were appointed as regimental surgeons, but central organization of the Medical Department for these medical services was not provided.

1798

Because of fear of a war with France, an attempt was made to reorganize the Army and Medical Department. The Physician General, Dr. James Craik, was authorized the rank, pay, and emoluments of a lieutenant colonel. Medical officers were appointed for the regiments, but hospital appointments had not been considered. Secretary of War Dr. James McHenry, a surgeon during the Revolution, noted this omission and recommended to Congress that it be corrected.

1800

Since war with France was no longer feared, Congress passed a bill discharging all the troops raised for the increase of the Army, including the Physician General and all medical officers, except six surgeons and twelve surgeon's mates.

1800-1812

During this interval very little information is available concerning the medical service of the Army. It is known that there was no central organization of the medical staff, and there was no hospital department. Sanitation in the modern sense did not exist. The average soldier was without medicines or medical attendance and recovered from illness by the strength of his own physical resistance or died in misery.

1812-1818. THE WAR OF 1812 TO THE ADMINISTRATION OF GENERAL LOVELL

1812

Congress provided for the appointment of such number of hospital surgeons and surgeon's mates as the service might require. However, the organization of the medical service was haphazard, leaving the medical officers without authority and subjected to many interferences from line officers.

1813

Members of the Medical Department were given uniforms for the first time in the history of the Army. The uniform was black, with a very high collar in front.

1814

The first Medical Department regulations which dealt with the duties of medical officers were issued as part of the Army regulations.

Dr. James Tilton, Physician and Surgeon General, abolished the distinction between a physician and a surgeon. Since that time army medical officers have been known as surgeons, although their duties have never been limited to the surgical specialty.

1815

The army was reduced to one-sixth its former size, and the Physician and Surgeon General was discharged on June 15. The Medical Department's only activities until 1818 seem to have been receipt of reports made by medical officers who took part in the War of 1812. Francis Le Baron continued as Apothecary General until April 18, 1818.

Other Events during the Period 1812-1818

Early observations were recorded relative to the cleanliness and ventilation of hospitals. Although preventive measures as we know them now were not used, there was a faint realization that the hospitals which were kept clean and well ventilated had the least dissemination of disease. It was again demonstrated during the War of 1812 that the care of sick and diseased soldiers was a larger burden than the care of soldiers injured in battle. Contagious diseases and infections from wounds caused more deaths than enemy fire. It was early evidence that the mission of the medical service must be "to conserve the fighting strength of the military force."

ERA OF CENTRAL ORGANIZATION

1818-1836. SURGEON GENERAL LOVELL'S ADMINISTRATION

1818

An Act of Congress reorganized the staff departments of the Regular Army, including the Medical Department. A Surgeon General was appointed as head of the Medical Staff. All orders and instructions, reports, and communications in connection with medical affairs were ordered to be issued through the Surgeon General's Office. This was the first basic central organization and the beginning of definite progress for the Medical Department. Because of his excellent service in the Northern Division during the War of 1812, and his *Remarks on the Sick Report of the Northern Division for the year ending June 30, 1817*, Dr. Joseph Lovell was appointed the first Surgeon General of the United States Army.

November 1. Surgeon General Lovell submitted the first quarterly report of the Medical Department to the Secretary of War.

1826

The first meteorological report issued by the Army was dated 1826 and entitled, *Meteorological Register for the Years 1822-25 inclusive, from Observations made by the Surgeons of the Army at the Military Posts of the United States.* It was prepared under the direction of Joseph Lovell, M.D., Surgeon General of the U. S. Army.

1833

A medical officer and pioneer physiologist, Dr. William Beaumont, encouraged by General Lovell, made his abstract report on *Experiments and Observations on the Gastric Juice and the Physiology of Digestion.* This report was based on his experiments on Sergeant Alexis St. Martin, who developed a gastric fistula following a gunshot wound through his stomach.

1836

The "Library of the Surgeon General's Office" was founded. (This is the origin of the present Army Medical Library in Washington, D. C.)

Other Events during the Period 1818-1836

The Medical Department regulations were further revised.

An Act of Congress required professional examination for appointment in the Medical Corps of the Regular Army; the pay and simulated rank of medical officers were established. Surgeon General Lovell introduced weather reports and included them in his quarterly reports to the Secretary of War. Many studies were made by members of the Medical Department relative to febrile diseases which were then prevalent; these diseases at that time included scurvy, bilious remitting fever, dysentery, and dengue. In his reports General Lovell attributed much illness to the excessive consumption of spirituous liquor, and it is probably the result of his recommendations that the rum ration was discontinued.

1836-1861. THE PERIOD FROM GENERAL LOVELL'S ADMINISTRATION TO THE CIVIL WAR

1836

November 30. General Thomas Lawson succeeded Surgeon General Lovell but did not assume the duties of his office until 1838. He was occupied in organizing a battalion of volunteers for the Florida Seminole War.

1840

Members of the Medical Department were given a new uniform with an aiguillette instead of epaulettes, which met with serious objection from the medical officers. Surgeon General Lawson wrote a letter to the Adjutant General expressing his opinions substantiating those of the medical officers. The following year the epaulettes were restored. The letters "M.S." were placed on the epaulettes as a mark of distinction. However, it opened a long dispute about the rank of medical officers which continued until the Mexican War.

1841

The Surgeon General's Report for the year 1841 recorded the mean strength of the army as 9,748 officers and men, and admissions to sick report as 38,559. Of the latter, 320 were discharged from the service, 30 deserted, and 387 died. The above would indicate each soldier had been on sick report at least four times during the year.

1842

There was a marked reduction of the Army and the Medical Department following the Florida Seminole War.

1845

A general hospital and several regimental hospitals were established in anticipation of war with Mexico.

1846

May 13. President James K. Polk proclaimed a state of war to exist with Mexico and called for 50,000 volunteers; each new regiment was authorized to have one surgeon and one assistant surgeon.

William Lloyd Garrison, historian, stated the condition of the American troops in Mexico to be as follows: "There were no ambulances in the Army before 1859; only one hundred and eighty mule-drawn wagons were available on April 5, 1847; there were no shelter or hospital tents, hospital equipment, etc. Ignorance of the character of water supplies brought hundreds down with diarrhoea and dysentery; hospitals were hastily improvised in any convenient buildings, and the misery of the sick was increased by the squalor of Latin surroundings."

1847

An Act of Congress provided definite rank for medical officers.

Surgeon General Thomas Lawson recommended: an increase in the number of Medical Department officers; enlistment of competent and trained personnel as hospital stewards; extra-duty pay for hospital nurses and attendants detailed from the line.

1851

The first delegate from the Medical Department was sent to a meeting of the American Medical Association.

1855

The *Army Meteorological Register*, a separate weather data report, was prepared by a medical officer, Surgeon Coolidge. Previously the weather reports had been a part of the Surgeon General's quarterly report to the Secretary of War. The Medical Department submitted weather reports and other essential weather data for all stations from 1820 until the Weather Bureau assumed this task in 1855.

1856

Congress authorized the appointment of hospital stewards as had been previously recommended by Surgeon General Thomas Lawson in 1847.

1857

The caduceus of yellow silk worn on the sleeve was designated in Army regulations as the insignia for hospital stewards. The medical officer's uniform was similar to the line officer's except that the full-dress sash was an emerald green.

1857-1859

Medical Statistics, United States Army was published, the first part being completed in 1857 and the second part in 1859.

A study was made of medical transportation, and two types of ambulances were adopted.

1851-1861

Medical officers accompanied troops and furnished medical care during the Apache warfare in the southwest United States. They also provided medical assistance during the survey of the transcontinental railroads.

1861-1865. THE CIVIL WAR PERIOD

1861

Congress created the position of brigade surgeon and appointed 107 to this position. At this time Congress also authorized an addition of 10 surgeons and 20 assistant surgeons for the Medical Department, and allowed when necessary the use of female nurses with pay at the rate of fifty cents per day.

1862

William A. Hammond was appointed Surgeon General, the first medical officer to hold the rank of brigadier general with pay and emoluments of the position. Under his administration several important developments and recommendations were made. He issued orders requiring full and detailed reports about diseases and injuries which led

to closer professional supervision and improved the accuracy of statistics; the general hospitals were placed under the command of the Surgeon General; he started the Army Medical Museum; he added many books to the Library of the Surgeon General's Office; he made compilations for *The Medical and Surgical History of the War of the Rebellion*. He recommended the establishment of a permanent hospital in Washington, D. C., independent transportation for the Medical Department (ambulance corps), an Army Medical School, construction of hospitals by the Medical Department, and the establishment of a central laboratory; these recommendations were far-sighted and were executed many years later.

The "Letterman Plan" for the evacuation of sick and wounded was used successfully at the Battle of Antietam. It involved the use of field aid stations, ambulances, field hospitals, hospital trains, and general hospitals, upon which the present method of evacuation of sick and wounded in battle has been based. The plan called for an ambulance corps for each army corps, with two-horse vehicles, provided with two litters each, in the proportion of three ambulances for each regiment of five hundred. The ambulance corps was commanded by a captain; a lieutenant was provided for each division, one sergeant for each regiment, two privates and one driver to each ambulance, and one driver to each medicine wagon. The personnel was under the control of the Medical Director.

1864

General Hammond proposed that a plan similar to the "Letterman Plan" be adopted for the entire Army, and during the year this recommendation became law.

Other Events during the Period 1861-1865

During the Civil War, 1,057,423 sick and wounded were treated. There were 13,000 medical officers in the Union forces and 9,000 in the Confederate Army.

Many advancements in the Medical Department and in medical field service occurred during Surgeon General Hammond's administration. He was dismissed August 30, 1864, and Surgeon Joseph K. Barnes was appointed to succeed him. Later the findings and sentence of the court dismissing General Hammond were annulled, and he was retired as a brigadier general. He refused to accept retired pay and continued to lead an active and useful life until his death in 1900.

1865-1898. THE PERIOD FOLLOWING THE CIVIL WAR PERIOD TO THE SPANISH-AMERICAN WAR

1865-1898

The Civil War armies were demobilized and the Regular Army reorganized. However, by 1869 the Army was still further reduced by the action of the "Benzine Board"; the remainder was scattered to small stations in the South and on the western frontier. This increased number of stations was beyond the care of the small number of medical officers remaining in the Army, and authorization was granted to hire 264 assistant (contract) surgeons.

Eighty thousand dollars of the hospital fund on hand after the Civil War were used for the improvement of the Library of the Surgeon General's Office, and the first catalogue of this library was printed. It consisted of a pamphlet of 24 pages. (This library has reached international fame and is known as the Army Medical Library.) Lieutenant John S. Billings, Medical Corps, prepared the first printed catalogue of the Surgeon General's Library, a pamphlet of 24 pages. It was through the far-sighted efforts of Lieutenant Billings that the present Army Medical Library became a reality. He is recognized as one of the greatest medical officers of the United States Army.

An Act of Congress established the Hospital Corps.

The teaching of first aid to line officers and company bearers was instituted.

1866

Assistant Surgeon Albert J. Myer was made Colonel and Chief Signal Officer, the first officer to hold that position in the United States Army. Fort Myer, Virginia, was named in honor of this officer.

1867

A descriptive catalogue of the Army Medical Museum, Washington, D. C., was published.

1875

Colonel Jedediah H. Baxter, later appointed Surgeon General, prepared a report of *Medical Statistics of the Provost Marshal General's Bureau* which was published and is still used as a source of early statistical information.

1879

The *Index Medicus*, a monthly record classifying current medical literature, was originated by John Shaw Billings, a colonel in the Medical Corps.

1881

George Miller Sternberg, a medical officer and noted bacteriologist, discovered the pneumococcus. He also photographed the tubercle bacillus for the first time.

December. The caduceus, as a collar and a cap ornament, was adopted for the hospital stewards.

1885

Orders were issued by the Surgeon General directing that medical officers submit monthly sanitary reports.

1887

The Army and Navy General Hospital at Hot Springs, Arkansas, was completed and opened for patients. There were 16 beds provided for officers and 64 for enlisted men.

The law authorizing the organization of the Hospital Corps was signed by President Grover Cleveland. The uniform was trimmed in green with a red cross on a white arm band.

1888

The organization of the Hospital Corps neared completion and began to render valuable assistance to the Medical Department. The men transferred from the line to the medical service were given training in nursing and medical field work. They were soon utilized in the laboratories and in the operating rooms; they performed the duties of our modern nurse corps.

1890

A shield was adopted as a collar device for army officers, including the medical officers.

1891

The reports of Surgeon General Charles Sutherland indicated that the Medical Department was beginning to realize definitely the importance of sanitation in the housing of troops. Faults of construction, heating, ventilation, and drainage were recorded, but recommendations to improve these conditions went unheeded.

September 17. The radical defects of the medical departments of the organized militia units came to the attention of their medical officers, with the result that as a remedy they organized the "Association of Military Surgeons." This Association now includes medical department officers from all government services and is very active in the coordination of their activities. Its members receive *The Military Surgeon*, a monthly publication containing many timely and useful medical and military articles.

The objects and aims of the Association are to increase the efficiency of the Medical Services of the Federal Government both in peace and war by the further development of means to care for the sick and wounded and for the prevention of epidemics. This is accomplished by the following procedures: by mutual inspiration and improvement; by maintaining military practice as a specialty, well defined and clearly recognized; by constantly striving to improve military and naval medicine, surgery, and hygiene; by the creation of a living and growing body of medico-military literature available as a standard for permanent reference; by encouraging acquaintance between medical officers of the several services; by providing an interchange of views and ideas between these

medical officers; by establishing uniformity of procedure between the Medical Departments of the National Services and those of other countries; by preserving a medico-military *esprit de corps*; by maintaining the military position of the medical officer upon an equality in rank, authority, autonomy, and initiative with that of other officers; by encouraging legislation beneficial to the Medical Departments of all Services; by promoting a constant condition of readiness for duty in the Medical Departments of all of these Services.

The Association is the only organization in the United States which attempts to bring together and coordinate the efforts of the various medico-military services of the Federal Government.

The Association of Military Surgeons is now an incorporated body of medico-military men recognized by the Federal Government as a medical society organized to promote the specialty of military medicine, surgery, and sanitation. It was organized by the late Nicholas Senn, former Surgeon General of the States of Wisconsin and Illinois.

Active membership in the Association is open to: those who are, or have at any time been, commissioned officers in the Medical Department (or Service) of the Army, the Navy, the U. S. Public Health Service, the National Guard, the Organized Reserves, the U. S. Volunteers, and Acting Assistant or Contract Surgeons of these Services; regularly appointed members of the Medical Service of the Veterans' Administration and those who have been such; those who have been duly elected members of the Air Service Medical Association and of the Medical Veterans of the World War; officers of the Military Medical Services of other countries, and Medical and Dental Officers of the U. S. Indian Service.

The Association maintains an office in the City of Washington, where all business of the Association is transacted.

1893

Colonel George M. Sternberg, a pioneer bacteriologist in America, was appointed Surgeon General by President Grover Cleveland. Colonel Sternberg was the most professionally eminent officer in the Medical Corps and was in a position to achieve and conduct medical advancement. As Surgeon General he stimulated the professional zeal of all the medical officers of the Army. The Division Hospital at Manila, Philippine Islands, was later named the Sternberg General Hospital in his honor. It is the Army's largest and best hospital in the Philippines.

Authority was granted by General Orders No. 51, Adjutant General's Office, dated June 24, 1893, for the establishment of an Army Medical School. Originally, it was located in a building with the Army Medical Library and Museum, but the school has since grown, now having a special building at the Army Medical Center, Washington, D. C., where large numbers of medical, dental, and veterinary officers are instructed. It is a medical theater of scientific study, research, and instruction. (See Chapter II.)

1894

The modified Maltese cross was adopted in place of the shield as a collar device for medical officers.

1895

The Medical Department adopted the metric system of weights and measures for pharmaceutical procedures and prescriptions.

A room especially well cleaned, in which the necessary anesthetics, medicines, and equipment were kept, was required in each station hospital for emergency operations. These emergency rooms were the origin of operating rooms in station hospitals.

The new international system of statistical reports was adopted.

The department also began to furnish medical officers with current medical facts by sending them recent publications. (This custom still continues, and there are now well equipped, local medical libraries at many station hospitals.)

Other Events during the Period 1865-1898

Many advances in medicine occurred in which the Medical Department of the Army took an important part. Medical officers who accompanied troops came into contact with many kinds of febrile diseases, the most common of which was typhoid fever.

Diphtheria antitoxin was used with success by the Medical Department of the Army soon after its discovery. The Roentgen ray was also used soon after its discovery; its value as an aid to diagnosis and as a means of record and identification was soon appreciated by the Medical Department.

The interest in bacteriology manifested by the civilian doctor, as well as the medical officer, soon brought to light the necessity for preventive measures to control the dissemination of contagious diseases. Field sanitation became of major interest, and military medicine started to have a prominent part in military affairs. Water and food supplies were becoming a matter for inspection and discussion. Scientific studies were being made by many officers.

1898-1899. THE SPANISH-AMERICAN WAR PERIOD

1898

April 21. There were 192 medical officers and 791 enlisted men in the Medical Department when war was declared. This was not sufficient for the peace-time Regular Army of 28,000. The necessity for expansion of the Medical Department was evident, and the task was made more difficult because of the lack of experience and field training of the medical officers. With incomplete knowledge of field sanitation, without field equipment, without general hospitals, the Medical Department was given a perilous mission.

April 22. An Act of Congress provided for an increase in the Medical Department of 8 corps surgeons, 110 division and brigade surgeons, and 650 contract surgeons.

During the year the "Central Hospital Fund" was designated by the Surgeon General as a reserve fund. Into this reserve the custodian of each station hospital fund, upon request of the Surgeon General, was required to transfer the money in excess of its normal primary needs.

May 12. Congress authorized the appointment of 15 assistant surgeons. In 1894 Congress had reduced the number of medical officers by the same number.

May 18. The Surgeon General directed that regimental hospitals be discontinued and their supplies used for the establishment of division hospitals. Division hospitals were kept mobile, serious cases being sent to general hospitals. Near New York and Philadelphia many patients were sent to civilian hospitals, and others were furloughed home for recovery.

May 31. The Adjutant General authorized the transfer of men from volunteer organizations to the Hospital Corps. There were about 6000 enlisted and transferred men in the Medical Department during the war, and that was far from an adequate number to render even the minimum service. By the utilization of female nurses as overseers these men accomplished a great deal and received training which was useful later in the Philippine Islands.

June 2. Congress increased the number of hospital stewards (sergeants) to 200. It was difficult to increase the size of the corps during the war and even more so after the occurrence of epidemics, because soldiers feared taking care of the sick.

June 9. Secretary of War Russell A. Alger approved the use of the facilities and personnel of the American National Red Cross Association during the Spanish-American War. General Sternberg commended on several occasions the record made by these Red Cross nurses during the period 1898-99, relating their skill, sincerity, and devotion to duty.

July 2. The Hospital Ship "Relief," a converted passenger steamer, sailed for Cuba to transport sick and wounded to Montauk Point, Long Island, New York. Montauk Point was the point selected as a camp for returning troops. The ship "Relief" was used later in service to the Philippine Islands.

August 18. The general hospital at Montauk was completed. The boat "Red Cross Yacht" reported to assist in transporting sick and wounded to New Haven, New London, and Bridgeport hospitals. Several other hospital ships were also used, most of which were converted commercial ships. In the Spanish-American War, through the Women's National Relief Association, a corps of selected expert cooks and assistants was furnished to the Chief Surgeon of the Camp at Montauk Point for use in the kitchens of the hos-

pitals. The Army ration was increased until it included a menu equal to the best hotels of large cities.

Other Events during the Period 1898-1899

Medical service for the various campaigns in Cuba, the Philippine Islands, and Puerto Rico was furnished by the Medical Department and the Red Cross. The care of the soldiers in the camps was entirely inadequate. Since typhoid fever was frequently diagnosed as malaria, a short period of time elapsed before typhoid was recognized epidemic in nature. The death rate from both diseases increased month by month.

"The Typhoid Fever Board" composed of Major Walter Reed, Major Victor C. Vaughn, and Major Edward O. Shakespeare, all of the Medical Corps, was directed to make a detailed study concerning the epidemiology of typhoid fever in the military camps in the United States. They concluded that typhoid fever was not a strictly water-borne disease, and that it could be, and was, spread by personal contact.

The first vision of a future Dental Corps became evident when Hospital Steward J. W. Horner was assigned as corps dentist, assisted by Acting Hospital Steward Watts. They opened an office and attended dental patients of the Seventh Army Corps free of charge.

General hospitals which had been established were continued. The missions assigned to the Army following the Spanish-American War prevented reduction of its strength to that prior to the war. Consequently, the necessity for medical care for this personnel existed. The Medical Department had come to realize the value of general hospitals for treatment of patients requiring special therapeutic measures under the care of specialists. Civilian hospitals were also increasing in number as it was the trend of the period. The general hospitals which were established during the Spanish-American War and continued afterwards were: Sternberg, Letterman, Tripler, the general hospital for the treatment of tuberculosis at Fort Bayard, New Mexico, and the general hospital at Washington Barracks, Maryland.

Due to the sudden emergency of the war and the inability of the Medical Department to secure sufficient enlisted men, the need for an organized nurse corps was realized. The Nurse Corps (female) was organized in 1899 without any specific authorization. The early history of the Nurse Corps was included in the Surgeon General's report for 1899. There were 1158 nurses in service on September 15, 1899; however, during the war contracts were made with 1,563 nurses.

The casualties of the Spanish-American War were relatively few. In the Army 22 officers and 244 men were killed; in the Navy 1 officer and 17 men were killed—a total of 284 deaths out of 235,631 men engaged in war. About 3,500 died because of disease; most of these deaths were due to the typhoid epidemic which was prevalent in the Army camps during the War.

The Medical Department won the favor of the American people and began to get the support and sympathy of the public. Since the public was interested the problems of the medical service were better known to them. The war service provided a valuable experience, consolidating members of the department into a cooperative and aggressive band of workers. It was a difficult but important period in the progress of medicine and the future of the Medical Department.

1899-1914. THE PERIOD AFTER THE SPANISH-AMERICAN WAR TO THE WORLD WAR

1899

As a result of the Spanish-American War and immediately after its termination, "The Dodge Commission" was appointed by President William McKinley to investigate and report on the conditions of the Army. The Medical Department was definitely included and its errors and needs investigated. Fulfilling the recommendations of the Dodge Commission occupied the attention of Army leaders for many years following the receipt of the findings.

April 11. The peace treaty, originally signed December 10, 1898, was finally confirmed. The strength of the Regular Army was then established at 65,000. The men enlisted for the Spanish-American War in the Hospital Corps were retained in the Philippines longer

than those who volunteered for service in the line; this was due to the necessity for improving sanitary conditions there.

1900

Medical personnel accompanied the troops who were sent from the Philippines to suppress the Boxer Rebellion in China. The sick and wounded were handled successfully, final evacuation being to San Francisco. (The Medical Department furnished personnel for medical care to Army troops in Tientsin, China, from the time the International Force of Occupation was established until the Army units were withdrawn in 1938.)

The Medical Department established the first "Tropical Disease Board." It was established in Manila, Philippine Islands, for the study and control of tropical diseases.

May. A board composed of Major Walter Reed, Major James Carroll, Dr. Jesse W. Lazear, and Dr. Aristides Agramonte was appointed by Surgeon General Sternberg to study the transmission of yellow fever. They began their investigations in Quemados, near Havana, Cuba a month later. This board demonstrated positively that yellow fever is transmitted by the bite of the mosquito *Aedes aegypti*.

1901

The Act of February 2 authorized a strength of 100,619 officers and men for the Regular Army; this included an increase of the Medical Corps officers from 192 to 321 and the hospital stewards from 200 to 300.

This same Act authorized the employment of thirty dental surgeons under contract; it also recognized and confirmed the establishment of the Nurse Corps (female).

All Medical Department personnel were directed to wear the caduceus as a collar ornament on the uniform. The Maltese cross previously used was discarded. Green was discontinued as the department color, and maroon, which is the present color, was adopted.

1903

March 2. The title of "Hospital Steward" was eliminated and the title "Sergeant First Class" substituted by the Act of March 2, 1903. The same Act provided that the Hospital Corps would consist of sergeants first class, sergeants, corporals, privates first class, and privates.

National Guard medical units were organized to provide field medical service to the rear boundary of the division.

Major William C. Gorgas reported that he had succeeded in the campaign against yellow fever and that no new cases of this disease had originated in Cuba for two years. Major Gorgas had successfully put into practical application the principles established by Major Walter Reed and his board. He conceived of a triple threat against yellow fever: first, destruction of mosquitoes; second, prevention of mosquito breeding; and third, protection of yellow fever patients from bites of mosquitoes. To accomplish this task, he organized a "Stegomyia Brigade," an "Anopheles Brigade," and a "Yellow Fever Brigade." The first two were used for the prevention of mosquito breeding and the latter for the destruction of mosquitoes within houses occupied by yellow fever patients.

In spite of shortage of medical officers, the Surgeon General loaned officers to other government services to assist in important scientific work. Captain B. K. Ashford was placed at the disposal of the insular government of Puerto Rico to carry out a campaign against a "tropical anemia" due to hookworms. This policy continued for many years afterwards, and included the assigning of Colonel William C. Gorgas and five other medical officers to Panama and Major J. R. Kean to the governor's staff in Cuba. The latter, assisted by four other medical officers, guided the sanitary department of the island.

1904

Brigadier General Fred C. Ainsworth, who had been in charge of the Division of Records and Pensions in the Surgeon General's Office, was made the Military Secretary. Later, when the title was changed back to "The Adjutant General", he continued to hold the position.

1906

March 21. The second "Tropical Disease Board" was established (W. D. Special Orders No. 16, January 19, 1906) in Manila, Philippine Islands. The more important

work of this board and the previous board established in 1900 included the following: the confirmation of the mosquito theory of dengue transmission; discovery of a new species of filaria, malaria; studies in *amoebiasis*, leprosy, cholera, and yaws; extensive observations regarding the influence of tropical climates; investigations as to the causation of beriberi; eradication of beriberi among Philippine Scouts; discovery of a cure for infantile beriberi; determination of the amoebicidal properties of emetin, as a result of which that drug became the established specific for amoebic dysentery; investigations regarding surra in horses; studies as to the prevalence of typhoid fever and diphtheria in the Philippine Islands; experiments on the effect of ultraviolet light upon amœbæ; experiments regarding the relative value of different uniform materials and military head coverings for use in tropics; observations on pulse rates, blood pressure, and blood composition in the tropics. This second board continued until October 24, 1914, when the board was dissolved.

The first motor ambulance was obtained for the Army and placed in use at Washington Barracks, Maryland.

President Theodore Roosevelt instituted the annual physical examination for all field officers. He had developed a keen interest in medical affairs during the Spanish-American War.

1907

April. President Theodore Roosevelt appointed the Panama Canal Commission of which Colonel William C. Gorgas, Medical Corps, was a member. The combination of Army administration and competent field sanitation was a paramount necessity; the United States had selected the tools to conquer the jungle, which had defeated former attempts because of disease.

1908

Major F. F. Russell, Medical Corps, submitted a report on the epidemiology of typhoid fever. He had studied about its effects in foreign armies while he was in England. After receipt of his report, a board was appointed which reviewed the history of vaccination against typhoid with the view of its use in the protection of troops. The findings and recommendations of this board led to the adoption of antityphoid inoculation in the United States Army. The Army was the first institution to establish the use of typhoid vaccination on a large scale and to definitely determine its value in preventive medicine.

Acts of Congress made the following changes and provisions for the Medical Department: The Medical Reserve Corps was created and assignments to active duty permitted; the Medical Corps was increased by 6 colonels, 12 lieutenant colonels, 45 majors, and 60 captains or first lieutenants; promotion to the grade of captain was provided after three years' service; an increase in strength of the Medical Corps by four annual increments was provided; the pay of the Army was increased; examination for promotion to all grades of the Medical Corps below surgeon general was established.

The commissioned medical personnel of the Medical Department was designated as the "Medical Corps of the United States Army".

During this year a large collection of medical field equipment and supplies was stored for national emergencies, a practice which has been very helpful in many peace time disasters.

The preparation of typhoid vaccine for use in the Army and in other government services was started at the Army Medical School, Washington, D. C.

The Walter Reed General Hospital was built at Washington, D. C. It was named in honor of Major Walter Reed who headed the board that made the discovery of the means of transmission of yellow fever.

1909

February. The typhoid vaccine prepared at the Army Medical School was ready for use, and the War Department approved volunteer antityphoid inoculation. During 1909 it was given to 830 individuals.

Voluntary venereal prophylaxis was started. Since 1903 the Surgeon General had noted the prevalence of venereal diseases on the sick reports. This was a further step in the attempt to cut down the venereal rate of the Army.

1910

Leonard Wood, Captain and Assistant Surgeon, was appointed major general and Chief of Staff of the Army, the first medical department officer to attain that rank and position.

The first medico-military problem given in an Army school was solved by officers of the line in the Army Service School, Fort Leavenworth, Kansas.

Major John S. Morrison, Assistant Commandant and senior instructor in Military Art of The Army Service Schools, realized the need of medical information in the line, and in collaboration with Major P. M. Ashburn of the Medical Corps published a book *A Study in Troop Leading and Management of the Sanitary Service in War*. The disposition of medical troops and installations for a division were presented under various tactical situations.

Medical Service in Campaign by Major Paul F. Straub, Medical Corps, was also published. The need for careful consideration of the medical field service had developed a new field of tactical research.

Major C. R. Darnall, Medical Corps, originated the liquid chlorine method of water purification. Although not as widely celebrated as other medical feats, this method of water purification has been adopted throughout the world and probably has saved and will save more lives than any other single medical achievement.

1911

March 3. An Act of Congress established the Dental Corps of the Regular Army, consisting of 60 dental surgeons, as a part of the Medical Department.

November 13. A general order of the War Department was issued designating the large hospital at the Presidio of San Francisco, California, to be named Letterman General Hospital in honor of Surgeon Jonathan Letterman, who did so much for the organization of field medical service. There is also a field at Carlisle Barracks, Pennsylvania, used for demonstration of medical field service, appropriately named in his honor.

During the latter part of 1911, the War Department granted the request to establish the "Field Service and Correspondence School of Medical Officers" at Fort Leavenworth, Kansas. A six weeks course limited to 12 officers was started the next year. Six Medical Corps officers of the Regular Army and six medical officers of the National Guard attended. The school continued until the World War, and thereafter it was transferred to its present location at Carlisle Barracks, Pennsylvania.

Antityphoid immunization was made compulsory for all members of the Army, and inoculation was put into practice on the Mexican border.

1912

April 24. The National Red Cross was recognized by Congress. The President was authorized to employ its facilities with the Army and Navy according to such rules and regulations as he deemed best.

August 24. An Act of Congress consolidating the Quartermaster's Subsistence and Pay Departments included the "Manchu" provision, which required all officers of the Regular Army to serve two years out of each six with troops. This inclusion prevented medical officers from remaining on duty in Washington, D. C. on permanent assignment.

September 10. The Surgeon General announced a policy and issued regulations governing the operation of Red Cross units with the Army in time of war.

Major Edward L. Munson, M. C., as president of the "Army Shoe Board" devised the "Munson Last" for Army shoes. It was adopted by this Board for the Army and has since been adopted by large numbers of the civil population.

1914-1918. THE WORLD WAR PERIOD

1914

Colonel William C. Gorgas completed his medical service in Panama, where he had been the Chief Sanitary Officer during the construction of the Panama Canal. The first boat passed through the Canal on August 3, 1914.

Colonel Gorgas had achieved so much fame by the use of practical means in eliminating yellow fever from Cuba and Panama that it was evident he would succeed Surgeon General George H. Torney as head of the Medical Department. General Torney died suddenly of pneumonia on December 27, 1913, but Colonel Gorgas did not hear of his own appointment until later because he was in South Africa advising on the control of pneumonia. Well known and esteemed by the medical profession, he had been elected President of the American Medical Association in 1908. The successful completion of the task in Panama opened the eyes of the world to the value of preventive medicine. The Medical Department of the Army received recognition as well as the confidence and gratitude of Congress, of the Army, of the civilian medical profession, and of the American people. The health, economics, and commerce of the nation and world had been affected by application of simple sanitary measures within a strategic geographical area.

Colonel Gorgas was appointed Surgeon General with the rank of major general, the first surgeon general to attain that rank.

Due to the prestige of General Gorgas, Congress respected his council and advice; consequently the Medical Department progressed rapidly. It was fortunate that such confidence should exist at a time when, unknowingly, the nation was approaching a war that minimized by its immensity all previous warfare.

In 1914, the War Department issued *New Tables of Organization and Field Service Regulations*.

Medical officers began to take active training in field work and medical tactics. They participated in field maneuvers.

1916

The strains of paratyphosus "A" and "B" were added to the typhoid vaccine used by the Army.

Venereal prophylaxis was made compulsory, and a monthly physical inspection of enlisted men was instituted.

June 3. Congress passed the National Defense Act. Some of the provisions of interest to the Medical Department were as follows: a Regular Army limited to 175,000 enlisted men; reorganization of the Dental Corps providing grades of first lieutenant to major; organization of the Veterinary Corps (formerly civilian employees of the Quartermaster General's Department) as a part of the Medical Department, with rank from second lieutenant to major.

Reserve hospital and ambulance units were organized by the Medical Department in cooperation with the American Red Cross. The American Red Cross base hospitals previously organized were the initial and earliest American medical installations and service in the World War.

George P. Foster, Captain, Medical Corps, demonstrated that certain colds (upper respiratory infections) were due to an invisible and filterable virus.

1917

April 6. War was declared on Germany by the United States, and the Medical Department like other departments of the Army began a tremendous expansion. It was necessary to establish two separate medical services: a medical service for the theater of operations in France and another for the zone of the interior in the United States.

Fortunately, the Medical Department was not entirely unprepared for its task. The Medical Reserve Corps and the American Red Cross were in existence and were of invaluable aid. Much had been learned about field sanitation. Immunization against typhoid and smallpox was universally used. Nevertheless, a new medical problem in respiratory diseases appeared in the form of the influenza epidemic.

At this time the personnel strength of the Medical Department was recorded as follows: Medical Corps, 833; Dental Corps, 86; Veterinary Corps, 62; Nurse Corps, 403; and enlisted men, 6,619. There were in the Army 131 station hospitals, 4 general hospitals, and 5 temporary base hospitals, the total of which furnished a bed capacity of 9,530.

So many expansions of the Army began to take place at the same time that the facilities and personnel of the Medical Department had to be increased and made flexible to meet

new demands, as well as to carry on the increase of its normal work. It resulted in the creation of additional subdivisions and several independent divisions of administration, most of which were organized during 1917 and the early months of 1918. The five divisions which were already in operation were: Personnel; Sanitation; Supply (including Finance); the Army Medical Library and Museum; and the Division of Records, Correspondence, and Examining.

Since the Division of Sanitation handled all professional subjects, it was evident that it would receive the majority of subdivisions, which were the following: Hospitals, Overseas Hospitals, General Surgery, Military Orthopedic Surgery, Head Surgery, Internal Medicine, Neurology and Psychiatry, Laboratories and Infectious Diseases, and Roentgenology. The other four original divisions were divided into sections but, in general, remained intact.

The new and independent divisions were: Psychology, Gas Warfare, Foods, Air Service, and Physical Reconstruction. The Dental, Veterinary, and Nursing Divisions were closely associated with the Personnel Division and coordinated their activities with the administration division pertinent to their respective affairs.

A Sanitary Corps was organized to furnish the necessary technical assistance to the Medical Department officers. The members of this Corps were selected from highly trained and educated civilians with technical knowledge that made them valuable in laboratories and other auxiliary medical tasks. After the close of the World War many of the Sanitary Corps officers were commissioned as Medical Administrative Corps officers in the Regular Army; others continued in the Sanitary Corps Reserve. A regular peace-time Sanitary Corps of the Regular Army does not exist, but it is a corps of the Medical Department Reserve.

To facilitate the early use of the Medical Department of the United States Army a request was made by the French Army for an Ambulance Service. In response to this request a commissioned Ambulance Service Corps was established. It was discontinued after the World War.

Three hundred medical officers were sent to Great Britain and placed in training camps. This number was later increased to 1300. Upon completion of training, medical units were furnished to Great Britain, France, and Italy.

The bulk of the Medical Department officers was furnished by the Reserve Corps of the Medical Department. The Nurse Corps received its increase from the Red Cross Reserve. The additional enlisted men were drafted men or volunteers. The National Guard units in the war supplied their own medical personnel.

With the cooperation and the confidence of the American public, the interest and activities of the American Medical Association and other professional societies, the Medical Department went swiftly ahead with a medical program that was carried out not only efficiently but to a size never matched or visualized before.

Medical activity and progress in the zone of the interior was not limited to the Medical Department of the Army. Civilian institutions made their facilities available for training of the Medical Department officers and enlisted men. Linked with the training camps and schools this speeded up their preparation for war duty and permitted many more to be taught at the same time. The Red Cross filled all the needs for trained nurses; however, looking ahead into the future, the Army started the Army School of Nursing at Walter Reed General Hospital, Washington, D. C., with branch units in all military hospitals.

The influenza epidemic during 1917 and 1918 was a large medical problem of generalized national intensity. The civilian doctors, decreased in numbers by their colleagues in the government services, were taxed by many hours of vigilant duty. By no means did the epidemic miss the men in uniform. The World War casualties did not present any duties comparable to the control of this epidemic of respiratory disease known as influenza, and which so readily became complicated by pneumonia. There were 24,575 deaths among the officers and enlisted men of the American troops from this disease alone during the World War.

May. Since November, 1915, the Medical Department had been tentatively assigned the

task of furnishing gas-defense equipment, but in May, 1917, it became a definite responsibility. A special division of the Medical Department was organized and placed under the charge of Colonel W. P. Chamberlain, Medical Corps.

May 8-19. During this period six fully equipped base hospitals had been shipped from the United States and were on the way to Europe. These hospitals were ready for operation before General John J. Pershing, the Commander in Chief of the American Expeditionary Force, arrived the latter part of May.

June. Colonel William J. Mayo, Medical Reserve Corps, was asked to report to Washington, D. C. to act as an adviser in organizing the Division of Surgery. The Medical Department profited a great deal by the cooperation and interest of Colonel Mayo and other capable medical men who were interested in the welfare of their nation. It can also be said that they in turn gained new professional knowledge and thereby profited by their Army experiences.

June 13. There were with the American Expeditionary Force in Europe seven medical officers and two enlisted men of the Medical Department. The organization of the Medical Department of the American Expeditionary Force was not yet established, but plans were being completed rapidly.

July. The Hospital Division of the Medical Department was created and Colonel Robert E. Noble (later Major General) was placed in charge. This division made plans and provisions for constructing and establishing the necessary hospitals. In some instances entire army posts were converted into hospitals. By autumn 44,000 beds were available for use in the large camps of the United States. This division was afterwards headed by Colonel (later Brigadier General) James D. Glennan who, on completing the necessary hospital provisions in this country, sailed for France and took charge of the Division of Hospitals in the Chief Surgeon's Office of the American Expeditionary Force.

In July the Chief Surgeon's Office was established in Chaumont, France. As the administrative departments of the American Expeditionary Force simulated those of the War Department, so the Chief Surgeon's Office simulated the Surgeon General's Office and was organized accordingly with almost identical divisions and subdivisions.

The Medical Department of the American Expeditionary Force early received the whole hearted support of General Pershing, resulting in the rapid development of the American medical service in Europe.

August. The Division of Physical Reconstruction was created for disabled soldiers, Colonel Frank Billings, Medical Corps, being placed in charge. The purpose of this division was to secure for disabled soldiers the proper facilities for treatment and care which would restore them to the best possible health.

September. Major Theodore C. Lyster, Medical Corps, was assigned Chief Surgeon of the Air Service for the purpose of organizing a specialized service, giving particular attention to aviation medicine. Necessary specialists and equipment were made available and a central testing laboratory was established at Mineola, Long Island, New York.

September 4, 11:00 p.m. First Lieutenant William T. Fitzsimons, Medical Reserve Corps, United States Army, was killed by an enemy airplane bomb that was dropped in the area of General Hospital No. 11, British Expeditionary Force, near Camiers, France. Lieutenant Fitzsimons was the adjutant of the United States Army Base Hospital No. 5 which was operating General Hospital No. 11 of the British Expeditionary Force. He was the first American officer to be killed by the enemy during the World War, and in recognition of his death the War Department named the largest army hospital at that time "The Fitzsimons General Hospital." This hospital is located at Denver, Colorado.

The same night, a little later and in the same area, another enemy bomb killed Private First Class Oscar C. Tugo of the Medical Department. He was the first enlisted man of the United States Army to be killed during the World War. Tugo Hall, the gymnasium building at Carlisle Barracks, Pennsylvania, was named in his honor.

October 18. A medical board was established by the Adjutant General's Office for the consideration of all matters pertaining to the physical examination and physical standards of airplane pilots.

October. The Food Division was authorized and Lieutenant Colonel John L. Murlin, Sanitary Corps, was placed in charge. The purpose of this division was to improve cooking, to prevent waste, to secure better balanced diets, and to increase the nutritional value of foods served in the Army.

General John J. Pershing made a request for the appointment of a Superintendent of Nurses for the American Expeditionary Force, and Miss Bessie S. Bell, a former chief nurse of Walter Reed General Hospital, was selected and assigned the position.

November. In the American Expeditionary Force, the issue of gas-defense equipment was turned over to the Chemical Warfare Service.

December. The Sanitary Corps had trained 186 officers and 1199 enlisted men who later were transferred to the Engineer Corps.

There was now in the Medical Department of the American Expeditionary Force a hospital bed capacity of 63,000. Plans had been made in October for 200,000, and this was the progress for the two months' construction.

1918

January. The Research Laboratory for Aviation Medicine was completed at Hazelhurst Field, Long Island, New York.

The Division of Psychology was established with the object of eliminating mental defects and to classify personnel examined for special services. It was originally a section of the Division of Neurology and Psychiatry. Major Robert M. Yerkes was placed in charge. Before the Armistice was signed, 1,151,552 men had been examined, and a large research problem in psychology had been performed.

February. The Service of Supply (S.O.S.) of the American Expeditionary Force was organized. This S.O.S. included the Medical Department and had headquarters at Tours, France. It was divided into sections, each section having its own section surgeon. Because of the close friendship and the cooperative spirit of the heads of the medical departments of the S.O.S. and the zone of the armies, this arrangement worked out harmoniously.

March. There were 2,099 nurses from the United States in service in France, 700 of whom were serving with the British forces.

April 28. Colonel Merritte W. Ireland, M.C., was made a brigadier general and The Chief Surgeon of the American Expeditionary Force, replacing General A. E. Bradley who became ill and was invalided home. General Ireland had a thorough knowledge of the department as he had been serving as assistant to General Bradley. General Ireland was the original choice of General Pershing for Chief Surgeon, but General Bradley was senior to him and General Ireland expressed his thorough willingness to serve as General Bradley's assistant.

May 25. The Secretary of War authorized the establishment of the Army School of Nursing at the Walter Reed General Hospital, Washington, D. C. This school trained many nurses who after the war returned to civilian life and fostered a fine reputation for their professional training school.

June. The hospital-bed capacity of the Medical Department in the United States had expanded to 73,066, and construction was in progress for an additional 16,799.

The combat forces had so many sick and wounded in France that the Chief Surgeon, General Merritte W. Ireland, cabled to the United States for all available assistance. The Medical Department of the American Expeditionary Force, as of June 1, consisted of 5,198 officers, 2,539 nurses, and 30,574 enlisted men.

The responsibility of the Medical Department of the United States Army for furnishing gas-defense equipment was turned over to the Chemical Warfare Service. Prior to this date, however, the Medical Department had already furnished 1,718,000 gas masks, 502,000 extra cannisters, and 154,000 horse masks.

July 9. An Act of Congress provided that the Nurse Corps (female) would be known as the "Army Nurse Corps of the United States Army".

August. The personnel of the Medical Department of the American Expeditionary Force had increased to 9,601 officers, 4,735 nurses, and 67,144 enlisted men.

The United States Army sent an expedition to Eastern Siberia with a force of 8,831 officers

and men. The medical personnel of this expedition consisted of 698 officers and men. Activities of this expedition extended as far as 1,700 miles away from the base at Vladivostok. Medical statistics show that there were 8,100 admissions to sick report and 86 deaths.

Another large American Expeditionary force of 4,477 officers and men was sent to Archangel, Siberia in August, accompanied by the necessary medical personnel. Total admissions to hospitals were 2,352. There were 104 deaths in hospitals, and 82 deaths occurred in battle.

General Merritte W. Ireland, the Chief Surgeon of the American Expeditionary Force, in recognition of his able and outstanding service, was promoted to the rank of major general. His responsibility and activity were proportionate to the rapidity of expansion and the burden of the Medical Department at this period.

August 22. The War Department regained control of the Carlisle Barracks Military Reservation, previously administered by the Department of the Interior.

September. Medical activity of the World War was at its peak. Influenza was adding to the task of the Army, especially the Medical Department. Nevertheless, according to reports received from active combat units, the average elapsed time from the soldier's receipt of a battle wound until he reached a field hospital was about five hours. The average elapsed time from the front line to an evacuation hospital was ten hours. Many factors altered the time element, but in spite of all obstacles few if any went without medical care. The wounded arrived at the base hospitals in train loads of 300 to 500 men, with several train loads per day.

During this month, 52,762 short tons, approximately 6,331,440 cubic feet, of medical supplies were shipped across the Atlantic Ocean to the American Expeditionary Force. The equipment for sixty base hospitals of 1,000 beds each was also available and awaiting shipment.

The Veterinary Service was organized temporarily as a part of the Remount Service.

October 4. General Merritte W. Ireland was appointed Surgeon General, succeeding General William C. Gorgas. Brigadier General Walter D. McCaw became the Chief Surgeon of the American Expeditionary Force. General Ireland had built up a large, efficient Medical Department in foreign territory, and in less than six weeks the task of demobilizing this same organization to include the zone of the interior would become his responsibility. The Army consisted of over three and one half million men, who would have to be examined physically and returned to peace-time activities.

November 11. Armistice Day terminated the World War combat activities, but it did not end the duties of the Medical Department and other Army services. At the close of the war the Medical Department itself had expanded to: Medical Corps, 30,591; Dental Corps, 4,620; Veterinary Corps, 2,002; Sanitary Corps, 2,919; Nurse Corps, 21,480; and enlisted men, 281,341. The Medical Department was larger by 100,000 than the entire Regular Army of 1939.

There were 76,964 patients in base and general hospitals of the United States and 193,026 patients in hospitals of the American Expeditionary Force, a total of 269,990 patients who were undergoing active treatment on November 11. The normal bed capacity of the hospitals of the American Expeditionary Force was 192,844, with an emergency expansion capacity to 276,347. There were 153 base hospitals, 66 camp hospitals, and 12 convalescent camps in France.

The maximum strength of medical personnel in the American Expeditionary Force during the World War was 18,146 medical officers, 10,081 nurses, and 145,815 enlisted men. The bed capacity of 91 large hospitals in the United States totaled 120,916. Construction was in progress for 25,000 more beds, and plans had been made for an additional 60,000 beds.

The Medical Department during the World War treated 4,000,000 sick and wounded in hospitals, and over 7,000,000 men were given physical examinations. Besides this professional work there were many administrative duties. The Medical Department in both the zone of operations and the zone of the interior maintained and operated hospitals, laboratories, medical supply depots, hospital trains, training schools, and numerous other essential medical activities.

Approximately \$314,544,000 were spent to accomplish the medical missions of the United States during the World War, which was only 2.2 per cent of the total war expenditure of \$14,244,061,000. The medical service extended to Great Britain, France, Italy, Siberia, and, after the Armistice, to Germany.

The files of the Surgeon-General's office record the medical service of the World War as follows:

"Each soldier of the A.E.F. was provided, as a part of his individual equipment, with either a Medical Department regulation first aid packet or a front packet, enclosed in a metal case . . . comprised of two gauze bandages, three and one-half by three and one-half inches, two gauze bandages, four by eighty-four inches and two safety pins. The packages contained definite directions for application. Medical Department enlisted men assigned to the battlefield carried usually in a duffle bag or gunny sack a liberal quantity of these packets and also iodine swabs. This was important because of the frequency of multiple wounds and of the frequent lack of a packet on the person of the wounded by reason of its having either been lost, or, contrary to instructions, applied to a wounded comrade.

"The idea was to apply first aid immediately at the place where the wound was incurred, either by Medical Department personnel on duty with organizations in the front line or serving as litter bearers, or by litter bearers detailed from the line who were instructed in elementary first aid.

"Company Aid Station.—In some instances stations subsidiary to battalion aid stations were established in the front line for each company, conducted by two dressers assigned from the battalion medical personnel. At these company aid stations emergency treatment was given the wounded brought thereto usually by line litter bearers.

"Such stations were more commonly used in trench warfare when it was possible to keep a small supply of surplus dressings and even splints, and sometimes a battalion medical officer took station there; but in open warfare the only available dressings were those carried on the person, and often the only shelter was that afforded by a shell-hole, consequently the wounded habitually were borne to the battalion aid station.

"The Battalion Aid Station.—In trench warfare, battalion aid stations usually were located in dugouts in the support line, two hundred and fifty to one thousand yards in rear of the front line, on or near an evacuation trench. Briefly, the equipment, in addition to that enumerated in supply tables for a battalion, consisted of medical and surgical supplies adequate for a modern emergency first aid room. It included at least two Thomas splints, and a shock table for warming patients. Light was supplied by simple petroleum lamps, and in some electricity was present. Cooking was done below, when possible, coke or any available fuel being used and ventilators having dampers for excluding gas, led to the surface. . . . The source of heat was small wood-burning stoves. . . . Supplies were usually brought up by battalion medical carts . . . and habitually included stimulants and ample facilities for the preparation of hot liquid foods, and other articles of food were also stocked, as often in periods of intense bombardment patients could not be evacuated until after dark. . . . With respect to surgical treatment, the procedures which obtained in the battalion aid stations may be summarized as follows: (1) Revision of first aid dressing. Pain, when present, was usually due to constriction of the wounded parts by gauze and bandage, which required changing or loosening. (2) Revision of splinting to insure proper immobilization for subsequent transportation. Application of the Thomas leg or arm splint when traction was indicated.

"To arrest severe hemorrhage whenever the element of time, available surgical facilities, and good surgical judgment permitted, the bleeding artery was sought in the wound and ligated above and below its laceration. . . . Only dire necessity justified the evacuation of a patient with tourniquet on arm or thigh. . . . The maintenance of the body heat of the wounded by means of blankets, coats, hot water bottles, canteens filled with hot water, and hot drinks (when not contraindicated by the nature of the wound) was vastly important. . . . Antitetanic serum was administered habitually, even in case of an apparently trivial wound, and the fact of administration recorded on the field tag, and indicated on the patient's forehead by a cross painted with iodine. If the

wound or dressings involved the forehead, the cross was painted on the dorsum of one hand. The standard dose of morphine, one-fourth grain, was given immediately to all severely wounded, and to those slightly wounded in whom the element of pain was considered to be a factor in the development of shock. Often it was found advantageous to repeat the dose. . . .

"In battalion aid stations, it was usually impossible for the surgeon to scrub his hands and change gloves for each wound treatment: Water and gloves were not always available, or the supply was limited. However, instruments could be sterilized sufficiently by immersion in alcohol or ether, and by experience, the surgeon could easily learn to dress all wounds without having his hands make contact with septic tissues or objects. With two pairs of dressing forceps, or with one pair each of artery and dressing forceps, he could accomplish any kind of dressing and continue with a series of cases without scrubbing his hands or changing his gloves after completion of each. . . .

"The Dressing Station.—The number and locations of divisional dressing stations were dependent upon the roads, available shelter and the width and activity of the divisional sector; generally from one to three to a division, located from three thousand to six thousand yards from the front line.

"In trench warfare the dressing station, usually located in a dugout or in any available building, contained a greater amount and variety of equipment than was possible in open warfare, and had separate rooms for such purposes as receiving, recording and dressing the wounded, for shock treatment, the serving of hot foods, and for administration. Since more time was available for the care of men brought to the dressing station than was true in open-warfare conditions, many who were merely exhausted were returned to duty after a few hours' rest during which they were given hot food; also, casualties depleted by hemorrhage or suffering from shock could be retained longer and consequently evacuated in better conditions. The personnel usually worked in shifts.

"Each dressing station was placed as near the front as conditions permitted, the location selected being generally with a view to its subsequent occupation by a field hospital as the action developed. . . .

"The function of the dressing station in general was to receive casualties, to administer indicated emergency treatment, and to evacuate to designated destinations when conditions permitted, but, habitually, to field hospitals. The emergency treatment comprised arresting hemorrhage, readjusting dressings, applying or readjusting splints, administration of morphia and of antitetanic serum, when time permitted, stimulation by hot drinks, and the retention and reviving of gassed and shocked cases as far as possible. Operations were limited practically to the closure of aspirating wounds of the chest, and to emergency ligations.

"The Field Hospital.—The field hospital was the last and largest divisional unit of the Medical Department in the chain of evacuation, the function of which, in general, was to receive casualties from the dressing station, and to institute all measures possible under varying conditions to best fit them for continued evacuation, usually to evacuation hospitals. Field hospitals were located from three to eight miles from the front line, depending upon such factors as the enemy range of fire, roads, fuel, water, availability of buildings, and the location of evacuation hospitals. Whenever possible they were grouped, preferably in a village or at the confluence of roads from the sector served, for convenience both in the interchange of patients and for the ambulances.

"In trench warfare and in some quiet sectors the field hospital was of semi-permanent character and was often elaborately installed with modern equipment and conveniences in well-adapted, commodious buildings or well-arranged dugouts. The equipment, in addition to all surgical essentials, included electric lights, portable radiographic and laboratory units, steam sterilizer, and other similar conveniences. In a few instances they, complete with equipment, were taken over by the French. Usually, under these conditions, one field hospital functioned as triage and cared for the wounded and gassed, one cared for the sick, one for skin and venereal cases, and a fourth was held in reserve, frequently conducting a convalescent camp for transportable patients and supplementing the others as required. All cases likely to become fit for duty in from ten to fourteen

days were held. While no definitive measures were undertaken, greater latitude and freedom of action within the discretion of the staff was customary than usually proved possible in open warfare.

"The normal personnel of the field hospitals usually was augmented by the division specialists of the various branches and at times also by special operating rooms and shock teams. In a few instances, their facilities for the care of non-transportable wounded were increased by the attaching of mobile surgical units.

"It was not intended that definitive surgery should be performed in field hospitals except upon certain non-transportable patients, as evacuation hospitals were provided for this purpose. The scope of professional activities in field hospitals varied greatly according to the intensity of the action, but during an offensive it was customary to evacuate all patients as soon as they could endure transportation."

1918-1931. GENERAL IRELAND'S ADMINISTRATION AFTER THE WORLD WAR PERIOD

1918

November. Demobilization and reorganization of the Regular Army was the problem of the hour, returning and restoring men to their occupations in the homeland. The Army consisted of over 3,500,000 men; the Medical Department had over 350,000 officers and men. There were still approximately 265,000 sick and wounded remaining in hospitals in France and the United States. The Medical Department continued to restore the disabled and sick soldiers to the best possible health. Physical examinations were conducted on all soldiers prior to their discharge in order to make records of their physical condition and to list their disabilities if any were noted.

1919

May. The "Medical Research Laboratory and School for Flight Surgeons" was established at Hazelhurst Field, Long Island, New York, and the first course of eight weeks was started.

June. A serious outbreak of typhus fever in Serbia led to the dispatch of a commission by the American Red Cross to fight the disease. Lieutenant Colonel Edgar Erskine Hume, M.C., United States Army, was appointed Chief Medical Officer and American Red Cross Commissioner. The work was completed successfully, and the Commission withdrew during the summer and early fall of 1920.

July 1. The Medical Department had gradually been reduced by demobilization to 12,731 officers, including the Medical Reserve Corps still on active duty, and 83,577 enlisted men. Approximately 18,000 officers and 195,000 enlisted men of the Medical Department had been discharged since Armistice Day.

July. The responsibility of caring for the war veterans was turned over to the United States Public Health Service. Several large Army hospitals used during the war were also transferred to the Public Health Service to increase their facilities for this added duty.

August. The "Medical Research Laboratory and School for Flight Surgeons" was moved to Mitchell Field, Long Island, New York, and the course extended to 4 months.

September 1. The Office of the Chief Surgeon of the American Expeditionary Force was concerned only with the personnel of the American Forces remaining in Germany.

December. The Chief Surgeon's Office of the American Expeditionary Force organized the Polish Typhus Relief Expedition consisting of Medical Department personnel of the Regular Army. This expedition was later placed under the control of the Army of Occupation in Germany.

Miss Julia Stimson was appointed Superintendent of the Army Nurse Corps in recognition of her excellent war service. She had been chosen by the Chief Surgeon of the American Expeditionary Force to be Chief Nurse of the Red Cross Nurses in France in March, 1918, which position she held until November of the same year. Then she was appointed Director of Nursing Service of the American Expeditionary Force. She returned to the United States in July, 1919, and served as Dean of the Army School of Nursing until her appointment as Superintendent of the Army Nurse Corps. She succeeded Miss Dora

E. Thompson, who voluntarily resigned as Superintendent. Miss Thompson, after return from an extended leave, was appointed Assistant Superintendent of the Army Nurse Corps.

1920

January and February. There was a mild epidemic form of influenza, which increased considerably the soldier death-rate for 1920. However, it was not as severe as the form of influenza during the World War which so frequently led to complications of pneumonia.

May 15. The Secretary of War authorized the use of the Carlisle Barracks Military Reservation for the purpose of establishing a Medical Field Service School. The Barracks, previously occupied by the Indian Industrial School, had been used by the War Department during 1918 as General Hospital No. 31. April 28, 1920, General Merritte W. Ireland, then Surgeon General, wrote to the Adjutant General requesting that the reservation be permanently assigned to the Medical Department for a service school for field training of its officers and enlisted personnel. The letter of approval from The Adjutant General's Office was dated May 15, 1920.

June 4. The amendments to the National Defense Act provided the Medical Administrative Corps as a part of the Medical Department to furnish an auxiliary service to the professional corps. The organization was fixed at 140 officers and the Corps was established by giving permanent commissions to enlisted men who had been commissioned in the Sanitary Corps during the World War.

Nurses of the Army Nurse Corps received relative rank and were authorized to wear insignia on their uniforms. They were given the rights and privileges of their respective rank as officers. The Superintendent of the Army Nurse Corps, Miss Julia Stimson, received the rank of major.

June 30. Over 5,500 military patients of the United States Army whose disabilities were caused by battle wounds were still remaining in hospitals of the United States.

July. The Medical Department officer personnel was further reduced to: Medical Corps, 1,948; Dental Corps, 322; Veterinary Corps, 283; and the Nurse Corps to about 1,500.

October 1. The Medical Department Equipment Laboratory was established at Carlisle Barracks, Pennsylvania, to provide an experimental laboratory for producing, testing, and determining the serviceability of medical equipment, especially the equipment used in medical field service.

During 1920. Graduates of Class A medical schools were accepted as internes in the larger station hospitals and the general hospitals of the Army. After completing an internship of one year many were offered commissions as first lieutenants in the Medical Corps.

1921

The Medical Field Service School was established at Carlisle Barracks, Pennsylvania, for the purpose of training Medical Department officers in Medico-military matters to include tactics, field sanitation, administration, organization of medical units for field service, equitation, motor mechanics, and allied subjects. On May 25 of the same year The Adjutant General approved the present coat of arms for the Medical Field Service School with the motto "To conserve fighting strength". (For further information relative to this school see Chapter II.)

February. The Medical Research Laboratory and School for Flight Surgeons was listed by the War Department as a "service school".

August. The "Veterans' Bureau" was created by Congress and became responsible for the care and treatment of the War Veterans. This duty had originally been handled by the Medical Department of the Army until July, 1920, when it was relinquished to the United States Public Health Service.

1922

Upon recommendation of Major General Merritte Weber Ireland, the Surgeon General, a third "Tropical Disease Board" was established in Manila, (W. D. Special Orders No. 38-0, February 19, 1922, and No. 85-0, April 12, 1922) where it functioned until Major General Robert Urie Patterson recommended its transfer to the Panama

Canal Department in 1934. The third Tropical Disease Board included in its membership medical, veterinary, and medical administrative corps officers. Hookworm, leprosy, tuberculosis, dengue, veterinary bacteriology, beriberi, cancer, surra, and rinderpest were among the subjects investigated in the Philippine Islands.

A general remodeling and modernizing of all field medical equipment was begun. The demobilization of the World War was nearing completion, and the lessons learned in that war were being given consideration and thought.

The need for a professional training school for Army dental officers had become evident and the Army Dental School came into existence at the Army Medical Center, Washington, D. C.

The personnel strength of the Medical Department was now as follows: Medical Corps, 983; Dental Corps, 128; Veterinary Corps, 126; Medical Administrative Corps, 72; Nurse Corps, 669; and enlisted men, 7,200.

Army Regulation 350-105 changed the name of the School for Flight Surgeons to "The School of Aviation Medicine."

1923

The regular monthly medical meetings which are held at the Army Medical Center were initiated. These meetings foster a closer relationship socially and professionally between Medical Department officers. In addition, they extend this relationship to corresponding medical officers and officials of other governmental agencies and civilian doctors practicing in the vicinity of Washington, D. C. Officers of the Medical Department Reserve Corps are also invited to attend. These meetings are held at eight o'clock at the Auditorium (center wing of the School Building), Army Medical Center, on the third Monday evening of each month, from October to May inclusive. The professional address and discussion is followed by a social hour during which refreshments are served.

The School Building of the Army Medical Center was built near Walter Reed General Hospital, Washington, D. C. The War Department issued orders directing that the Takoma Park section of the District of Columbia be known as "The Army Medical Center," Washington, D. C.

1924

The Medical Department Reserves had grown steadily and attained the following strength: Medical Corps, 7,559; Dental Corps, 3,055; Veterinary Corps, 865; Sanitary Corps, 416; Medical Administrative Corps, 880; and the Red Cross (Nurse Reserve), 40,636.

1926

June 30. The School of Aviation Medicine was moved from Mitchel Field, Long Island, New York, to Brooks Field, Texas.

1927

The *Index Medicus* of the Army Medical Library and the *Quarterly Cumulative Index of the American Medical Association* were combined and published jointly.

1928

Domestic cattle in the Philippines were vaccinated against rinderpest, practically eliminating this disease of animals from the Islands. The rinderpest vaccine used was prepared by Major Raymond A. Kelser of the Veterinary Corps, Regular Army. This immunization measure has been of tremendous value to economics of the Philippine Islands and adjacent countries.

The Reserve Corps of the Medical Department had continued to grow, and the number in each corps at this time was: Medical Corps, 12,113; Dental Corps, 4,706; Veterinary Corps, 1,061; Sanitary Corps, 497; Medical Administrative Corps, 1,889; Nurse Corps, 47,252. Many non-divisional reserve units of the Medical Department had been organized to which Reserve officers were assigned. Eight Regular Army Medical Department officers were assigned to full time duty in connection with industrial preparedness through procurement planning. Also, Reserve officers who were engaged closely with production of Medical Department supplies had been given tours of active duty in the Surgeon General's Office in order that procurement planning might be carried out more wisely.

1929

A medical officer, Colonel Harry L. Gilchrist, Medical Corps, was appointed Chief of the Chemical Warfare Service with rank of major general.

At the request of Major General Ireland, Surgeon General of the Army, Colonel P. M. Ashburn, Medical Corps, wrote and published *A History of the Medical Department of the United States Army* which was dedicated to the Unknown Soldiers of the Medical Department. This book covers in detail the growth and history of the Medical Department, the biographies of important Medical Department officers, and the activities and achievements of the Medical Department and its members. It is a book which every Regular and Reserve officer of the Medical Department should own and read.

In May of the same year, Lieutenant Colonel Edward B. Vedder, Medical Corps, published his book *Medicine, Its Contribution to Civilization*. Colonel Vedder had worked on the study of beri-beri while a member of the Tropical Board in the Philippines and had written an excellent book on the subject in 1913. He was also one of the first physicians to advocate the use of emetine in the treatment of amoebic dysentery.

1930

Lieutenant Colonel George C. Dunham, Medical Corps, published the first edition of *Military Preventive Medicine* (Army Medical Bulletin No. 23), a comprehensive text of basic information necessary to the practice of preventive medicine in the Army. The third edition was completed June 30, 1938. This excellent book is used as a text in the Department of Sanitation for the students who attend the Medical Field Service School at Carlisle Barracks, Pennsylvania. Its usefulness is not limited to the Army but is a ready reference in public health measures pertaining to civilian communities.

1931

An order of the Secretary of War directed the discontinuance of the Army School of Nursing, Washington, D. C. Its true professional value had been revealed by the excellent qualities of its graduates, but the school was closed for reasons of economy as graduates from civilian hospitals could readily be secured for commissions in the Army Nurse Corps.

October 30. The School of Aviation Medicine was moved from Brooks Field to Randolph Field, Texas, its present location.

December. The publication of the *Index Medicus*, originated by the Army Medical Library during Surgeon General William A. Hammond's administration, became a function of the *Journal of the American Medical Association*.

Other Events during the Period 1918-1931

Surgeon General Ireland made many progressive changes and additions to the Medical Department during his administration. He had a thorough knowledge of the needs of the Medical Department and its relationship to the rest of the Army. During the World War his leadership was in a large way responsible for the success and harmony between the combat forces and the medical service.

One of the largest of Surgeon General Ireland's advancements for the Army was the organization of the Army Medical Center, Takoma Park, Washington, D. C., where is located the Walter Reed General Hospital, The Army Medical School, The Dental School, The Veterinary School, and the technical training schools for enlisted men of the Medical Department.

The Medical Department passed through a stabilizing period following the World War; the knowledge which had been acquired shaped the development of future policies and organization of the Medical Department.

1932-1941. THE PERIOD FROM GENERAL IRELAND'S ADMINISTRATION TO 1941

1932

The Army Medical School was enlarged to provide additional facilities.

January 14. The Book Shop at the Medical Field Service School was opened for the benefit of officers of the Medical Department. This institution provided a place where

they could secure all materials necessary for instructional purposes in medico-military training.

1933

March. Complete medical service was instituted for the Civilian Conservation Corps. Reserve officers of the Medical Department were ordered to active duty and utilized as much as possible, relieving Regular Army Medical Department officers who had initiated this work. This medical service for the Civilian Conservation Corps is still conducted by the Medical Department of the Army.

July 1. The School of Aviation Medicine, Randolph Field, Texas, was closed until December 31 because of Civilian Conservation Corps activities.

The Medical Department was authorized to employ civilian nurses for the Civilian Conservation Corps at the rate of one nurse per each ten patients.

The increased activity of the Army in caring for the Civilian Conservation Corps required similar changes in the Medical Department, with expansion of the peace time hospital facilities. The medical supplies which were left over from the World War were utilized for the initial period of enrollment and establishment of camp dispensaries. The knowledge of field sanitation was put into practice immediately and proved its value many times.

1934

A post graduate course at the Army Medical School was initiated for Medical Department officers of higher grades as a professional refresher course.

January 2. The School of Aviation Medicine, Randolph Field, Texas, was reopened. Two courses for medical officers have been conducted each year.

April 19. In compliance with the recommendation of Major General Robert Urie Patterson, the Surgeon General, the Secretary of War ordered the transfer of the Third Tropical Disease Board from the Philippine Islands to the Board of Health laboratory, Gorgas Hospital, Ancon, Canal Zone. It was established there on July 26, 1934 and functioned until it was dissolved in 1939 upon the recommendation of Major General James Carre Magee. In Panama the Board's studies included malaria, dysentery, degenerative arthritis in horses and mules, and equine encephalomyelitis.

April 26. The Medical Department Reserve Officers' Training Corps enrollment was discontinued. The Medical Reserve Corps appointments were given to graduates of approved medical schools who were licensed and engaged in practice, upon recommendation of an examining board.

1935

January 30. The Veterinary Corps was reorganized with grades and promotion of officers from appointment to retirement made similar to appointment and retirement of the Dental and Medical Corps. All second lieutenants of the Veterinary Corps were promoted to first lieutenant at once.

1936

The average strength of the Medical Department was reported as: Medical Corps, 1,033; Dental Corps, 183; Veterinary Corps, 126; Medical Administrative Corps, 72; Nurses Corps, 625; and enlisted men, 8,377. Appropriation Acts provided an increase of 50 medical officers and 25 dental officers for each of the next three years, 1936, 1937, and 1938.

January 13. The Surgeon General's Office was reorganized into 10 divisions and 30 subdivisions. (See Surgeon General's Office).

February. The *Medical Instructors Bulletin* was authorized by the War Department to be issued by the Surgeon General to corps area and department surgeons and medical instructors of the National Guard and Organized Reserves. This bulletin contained information of special interest to medical instructors dealing with the problems of the National Guard and the Organized Reserves.

May 15. The Medical Reserve Officers' Training Corps was reestablished and, in the fall of the same year, instruction was started in several medical schools.

June 4. An Act of Congress provided changes in the requirements for appointment of Medical Administrative Corps officers. It limited appointments to graduates of a four year course in recognized schools of Pharmacy, thereby excluding the commissioning of former Medical Department enlisted men unless they possessed the above requirements.

November 16. The celebration of the 100th Anniversary of the founding of the Army Medical Library was commemorated in Washington, D. C. Approximately 600 guests were present, many of whom were world famous doctors, scientists, librarians, and representatives from medical institutions and societies from all parts of the United States and foreign countries. The chief oration was made by Sir Humphry Davy Rolleston, Baronet, G.C.V.O., K.C.B., M.D., Emeritus Regius Professor of Physic (Medicine), University of Cambridge, England. The library contained more than a million items and was then and still is the largest medical library in the world.

1937

January. A physiological research laboratory was completed at Wright Field, Dayton, Ohio. It was designed for research work in aviation medicine.

July. The *Medical Instructors Bulletin*, previously issued quarterly, was discontinued as a separate publication, and the information contained therein was placed in the *Army Medical Bulletin*. The latter, containing administrative and professional information of interest to all members of the Medical Department, is issued quarterly to each Regular Army officer of the Medical Department. This bulletin is edited by the executive officer of the Surgeon General's Office and printed at the Army Printing Plant, Carlisle Barracks, Pennsylvania.

September 9. Internships in Army hospitals were discontinued. Commissioned officers of the Medical Corps, Regular Army, were appointed by competitive examination. A physical examination was required before the candidate was permitted to take the professional examination. This method of appointment is still used.

December. Type I and Type II pneumonia immunization, following experimentation for one year prior to this time, was extended to the Civilian Conservation Corps in all corps areas using the vaccine prepared at the Army Medical School. The results proved very favorable.

During the year. Over 500,000 doses of typhoid prophylactic were made available to the Red Cross in the flood relief of the Ohio Valley.

The 1st Medical Regiment, Carlisle Barracks, Pennsylvania, assisted in relief work during the flood of the Ohio River Valley. The regiment arrived near Louisville, Kentucky, about January 30, and set up and directed medical care in several centers.

1938

Appropriation for the fiscal year 1939 authorized an average strength of 165,000 enlisted men and 14,659 officers for the Regular Army. The Medical Department strength was: Medical Corps, 1,183; Dental Corps, 258; Veterinary Corps, 126; Medical Administrative Corps, 63; Nurse Corps, 675; and enlisted men, 8,643. There were also 740 civilian employees in the Surgeon General's Office. An addition of two assistants to the Surgeon General in the grade of brigadier general was authorized.

The first brigadier general of the Dental Corps was appointed as Assistant to the Surgeon General, Chief of the Dental Division. Lt. Colonel Leigh C. Fairbank, Dental Corps, was appointed and assumed office March 17, 1938.

March 16. Central dental laboratories were established to serve groups of station hospitals with the exception of those station hospitals having their own dental laboratory service or those served by a general hospital laboratory.

April. A report was made which indicated that prior to this time there were 36 graduates of the Command and General Staff School, 30 graduates of the Army War College, 8 graduates of the Infantry School, and 31 graduates of the Army Industrial College in the Medical Department.

June. The daily mean strength of the Civilian Conservation Corps was 244,342. Therefore, in reality, the Medical Department was caring for the Regular Army plus the

Civilian Conservation Corps, a total of approximately 500,000. Since the enrollment periods are six months, many physical examinations for entrance and discharge from the Civilian Conservation Corps are conducted at these periodic intervals. Although the Civilian Conservation Corps was introduced on a temporary basis, it is now being considered for permanent establishment.

June 15. The President approved a bill passed by the Congress authorizing \$3,750,000 for the future construction of a building to replace the present Army Medical Library and Museum. However, funds were not appropriated for this construction in 1938.

June 29-July 6. About 1,900 Civil War veterans of the North and the South joined in a reunion at Gettysburg, Pennsylvania to celebrate the 75th anniversary of the Battle of Gettysburg, which was fought July 1, 2, and 3, 1863. The Surgeon General was in complete charge of all medical activities and responsible only to the Federal Commission. The Surgeon General utilized the 1st Medical Regiment, Carlisle Barracks, Pennsylvania, to carry out his medical plan. Including visitors the strength of the command reached a maximum of 209,319. There were 2,693 outpatient treatments, 83 admissions to hospitals, and 7 deaths. Only 2 deaths occurred at Gettysburg, the other 5 deaths occurring en route to or from the reunion of the Blue and the Gray. Lieutenant Colonel Paul R. Hawley, 1st Medical Regiment, was the Surgeon, Blue and Gray Reunion, and the representative of the Surgeon General. The civilian hospitals in nearby cities were used when necessary. Little difficulty was experienced in handling the veterans, who averaged the age of 94.

During the year. Research on the medical aspects of chemical warfare was carried on at Edgewood Arsenal, New Jersey.

1939

May. The George S. Huntington anatomic collection was presented to the Medical Department of the Army by the Columbia University Medical School. It is the most comprehensive and one of the most valuable collections of comparative and human anatomic specimens in the world, illustrating most structures of the body. The delivery of this collection to the Army Medical Museum was completed during May, 1939.

May 7-May 15. The Tenth International Congress of Military Medicine and Pharmacy met in Washington, D. C. Major General Charles R. Reynolds, Surgeon General of the United States Army, was President of the Congress and Chairman of the organizing committee. It was the first meeting of this medico-military congress in the western hemisphere.

July 15. President Roosevelt signed a bill authorizing the construction of a new building for the Medical Field Service School at Carlisle Barracks, Pennsylvania.

October. The Surgeon General announced that prospective dental officers might apply for training as internes in Army hospitals. This enables the Medical Department to complete the training of Dental Corps candidates under its own supervision.

December. As a part of the program initiated by the declaration of the President of a state of "limited emergency," the courses at the Army Medical School and Medical Field Service School were materially rearranged. The class at the Army Medical School was graduated December 1. Two Basic classes, for a period of three months each, were provided at the Medical Field Service School instead of one, the first to start December 4, 1939, the second March 11, 1940.

During the year. Authority was granted by the Congress to increase the medical officers of the Regular Army from 1133, as of July 31, 1939, to 1492 by June 30, 1949, this increase to be attained by equal, annual increments. During the fiscal year 1940, the Medical Corps was to be increased by 77 officers.

Because of the prevalent epidemics of equine encephalomyelitis in the United States during 1939, the Army Veterinary School completed the manufacture and distribution of sufficient encephalomyelitis vaccine for the immunization of all horses and mules of the Regular Army, National Guard, and R. O. T. C. units, and the vaccination of approximately 35,000 animals.

1940

January 15. A Medical Department Research Coordinating Board was appointed by Major General James Carre Magee, the Surgeon General, to investigate and report upon the various diseases or conditions directly affecting the military personnel and Army animals. The members included the chiefs of the Professional Service Division, Statistics Division, Finance and Supply Division, and Veterinary Division of the Surgeon General's Office; Chief of the Division of Aviation Medicine in the Office of the Chief of the Air Corps; the Assistant Commandant of the Medical Department Professional Service Schools, Army Medical Center; Director of Laboratories, Medical Department Professional Service School; Director of the Dental School; Chief of the Medical Research Division, Edgewood Arsenal, Maryland; and the Secretary of the Medical Department Professional Service School, Recorder.

June 30. The personnel strength of the Medical Department Reserve Corps was approximately as follows: Medical Corps, 16,000; Dental Corps, 5,000; Veterinary Corps, 1,500; Sanitary Corps, 500; and the Medical Administrative Corps, 1,200. The total strength of the Medical Department Reserve Corps was about 24,000.

July 15. Starting with the course of instruction beginning July 15, 1940, graduates of the School of Aviation Medicine were classified as "Aviation Medical Examiners." When a graduate has served a minimum of one year of active duty with the Air Corps, after having received such a qualification, and has demonstrated that he possesses the required qualifications, he may, under such regulations as the Surgeon General prescribes, be rated as "Flight Surgeon."

September 9. Construction began on the new school building (Hoff Hall) for the Medical Field Service School at Carlisle Barracks, Pennsylvania.

During the year. Changes in Army Regulations were made to classify noncommissioned officers of the Medical Department in all grades within two categories: the *tactical group* and the *hospitalization and administration group*. The tactical group includes personnel with medical regiments, medical battalions, medical squadrons, medical or veterinary troops, separate companies, medical or veterinary, and unit medical detachments. The hospitalization and administration group includes all other noncommissioned officers of the Medical Department.

WITH DUE RESPECTS TO ARMY MEDICINE

The Army medical officer is frequently confronted with the following or similar questions from his friends and civilian colleagues: "What medicine and surgery do you practice in the Army?"; or "What does the doctor in the Army accomplish as an individual?" The questions are often vague because so few people really know what the Army medical officer does and the scope of his activities. Neither do they know his responsibilities nor the true mission of the Army Medical Department of which he is a member. Therefore, it is in a brief resume of achievements of the Medical Department of the United States Army and its officers that this chapter may help the reader to discern the true value of Army medicine.

Army medicine in the United States began with the Revolutionary period when Dr. Joseph Warren, a major general of militia, and several other medical men fought in the line during the Battle of Bunker Hill. When the battle was over the wounded were placed in several large commodious homes which were used as hospitals. These doctors devoted their service in whatever capacity they thought most necessary for their cause of liberty. If the superiority of fire was deemed most urgent they placed themselves firing a weapon in the line, and when the firing ceased they returned to their medical work, caring for the sick and wounded.

This same spirit prevails in the Medical Department of the United States Army today. Its officers are still giving their time and efforts to preserve the fighting strength of our Army that is so necessary to maintain our freedom and liberty.

As the result of improved medical care and sanitation the health of America is constantly improving. The Army was one of the first organizations to put many of these modern health measures into practice with demonstrable success. A few examples of these methods

are: regular physical examination of the personnel of the Army; routine immunization against typhoid, smallpox, and diphtheria; and the control of venereal disease. The early discoveries, the application of practical sanitary measures, and the medical practices of the Army have not only prolonged the life of its own personnel but that of all people of the civilized world.

An Army Doctor Purifies Water

It was a medical officer of the United States Army who originated and devised a method of purifying water by means of chlorine. He discovered that the amount of chlorine required to kill the pathogenic organisms in water did not render it unpalatable for drinking. Later, in 1910, he added to his discovery by developing a mechanical *liquid chlorine water purifier* which is now used throughout the world. Major C. R. Darnall,¹ Medical Corps, is responsible for these feats, which have not been generally known to the public. Water can be purified in large quantities by this method, and large cities now are almost entirely dependent upon it since their original sources of water supply are unfit for human consumption. Purifying water, a source of many diseases, has done more to save human lives than any other preventive health measure.

The Army Conquers Yellow Fever

It was an Army doctor, assisted by members of his medical board, who made the outstanding investigation about *yellow fever*, proving this particular disease to be transmitted by the mosquito. Then the Army immediately went to work utilizing this information for the benefit of all mankind. Major Walter Reed, Medical Corps, was provided with the support of the Army in making this discovery possible. At that time Major General Leonard Wood, who was formerly a Medical Corps officer, was the Chief of Staff of the United States Army. Because of his medical knowledge and loyalty to the medical profession, he insured the cooperation of the Army in supporting the investigation, furnishing necessary personnel and materials to carry out the proposed sanitary measures. Yellow fever had ravaged Cuba for over 150 years and had puzzled many expert authorities; therefore, the United States Army can rightly take pride in this achievement.

The method of transmission of yellow fever having been determined, the Army quickly put on an active campaign against the guilty mosquito. In less than two years, under the supervision of Major William Gorgas, Medical Corps, Cuba became a tropical paradise, without yellow fever except those cases which came from outside sources.

The Army Builds the Panama Canal

Four years later, in 1907, when the United States was determined to build the canal across the Isthmus of Panama, the Army Medical Department was given the mission of controlling the yellow fever that had defeated the French in their attempt to build the Panama Canal. Colonel Gorgas was appointed Chief Sanitary Officer. He continued the same fight against mosquitoes in Panama that he had used successfully in Cuba. Yellow fever was eradicated in Panama, permitting the Engineer Corps of the United States Army to accomplish an engineering feat at which other countries had failed. The clearing of the jungles of Cuba and Panama brought not only a great economic result, but awakened the knowledge of the control of disease. Many cities in the tropics began to rise out of their diseased darkness and became prosperous, their populations healthy, and their locations attractive.

Therefore, thanks to the Medical Department of the United States Army, yellow fever no longer is a dreaded fear to the medical profession. Within the United States no case of yellow fever has originated for thirty years. In 1937 the reported prevalence of yellow fever was confined to Africa and South America. The benefits which have come to our civilization cannot be given a monetary value, but certainly the Army deserves unrestricted credit for the elimination of this disease.

The Army Investigates Typhoid

During the Spanish-American War in 1898, the Medical Department was confronted with the dreaded *typhoid fever*. Out of every 100,000 soldiers, 14,000 were admitted to

¹ Retired as brigadier general on December 31, 1931.

sick report with this disease. About 3,450 men died of diseases during this war, due mainly to the epidemics of typhoid among troops at camps.

The "Reed-Vaughn-Shakespeare Typhoid Board" composed of medical officers was appointed to make a study of the disease in the camps. The report of these Army officers on typhoid shed much of our present light on the disease. The one important factor missed was the detection of human carriers and their relation to the dissemination of typhoid. In the opinion of the medical profession of that period typhoid was generally considered a water-borne disease. The board's study disclosed many of the weak spots in sanitary measures and the agents by which typhoid is transmitted. Following the Spanish-American War, during which typhoid was so prevalent, a steady improvement was brought about by the general observance of sanitary measures. It was learned that it could be transmitted by means of direct contact, flies, milk, and water. Although prophylactic immunization was not known, the improvement in sanitation cut the admission rate for typhoid in the Army from 85.46 cases per 1,000 strength per annum in 1898 to 3 per 1,000 strength per annum in 1908.

In 1908 the Army sent Major F. F. Russell, Medical Corps, to Europe to study the epidemiology of typhoid fever in foreign armies. He submitted a valuable treatise from his study, whereupon the Army appointed a board to consider the use of vaccination for protecting the troops against typhoid fever. Voluntary prophylaxis was started in the Army in 1909 and made compulsory in 1911. The Army thereby introduced typhoid immunization into this country and initiated immunization on a large scale.

Now compare the results with those of the World War, since the Army had the necessary materials and facilities to carry out their studies and plans. It will be recalled that in the Spanish-American War that out of every 100,000 soldiers, 14,000 were afflicted with typhoid fever. In the World War this ratio was reduced to 37 cases of typhoid per every 100,000, a striking result of controlled, preventive medicine. Approximately 1,500 cases of typhoid occurred during the World War, whereas, in comparison to the Spanish-American War rate, there would have been 500,000 cases. The lesson from this evidence not only convinced the Army of the value of typhoid prophylaxis, but the entire medical profession accepted it sincerely; today anti-typhoid inoculation is a generalized and accepted practice. Army statistics report but four cases of typhoid in the Army in 1938, all of which were in the Philippines.

The Army has another conclusive record of the control of typhoid fever in the Civilian Conservation Corps, which has an average of 300,000 young men of typhoid age. The cumulative case rate per 1,000 strength per annum for the Civilian Conservation Corps since 1933 averages less than .25 cases per 1,000 strength per year. In 1936 the rate was .08 per 1,000 strength, a remarkably low figure, which illustrates the result of a controlled Army prophylaxis against typhoid when administered to a civilian body of men. The Army is a large contributor to the history and confirmation of typhoid inoculation. For 1936 and 1937 the typhoid and paratyphoid case rate in the United States was 12.4 cases per 100,000 population. The typhoid death rate per 100,000 population in the United States for 1935, 1936, and 1937 was 2.4.

The Army Makes and Distributes Vaccine

In addition to the administration of typhoid prophylaxis in the form of inoculations and sanitary measures, the Army produces a vast amount of typhoid vaccine in its laboratories. During national emergencies, such as the Ohio Flood Relief in 1937, over 500,000 doses of prophylactic vaccine were distributed to civilians. Besides furnishing this vaccine, the Army also placed its personnel, equipment, and transportation as needed to facilitate the service of relief. The former experience of the Army which occurred in the camps of the Spanish-American War was averted, and the fear of a typhoid epidemic checked before it started. The Army acts with sensible preparedness.

The Army Medical Department distributes vaccine to many agencies besides the Army itself. Its yearly distribution of typhoid vaccine is over 2,000,000 cubic centimeters, 500,000 cubic centimeters of which are held in reserve above routine requirements in anticipation of national emergencies. Other governmental agencies such as the Navy, Marine Corps,

Civilian Conservation Corps, National Guard, Reserve Officers' Training Corps, and Citizens' Military Training Camps secure their vaccine from the Army Medical School. In terms of immunizing courses (consisting of three doses) since 1929, over 6,000,000 courses (approximately 15,000,000 cubic centimeters) of typhoid vaccine have been distributed by the Army Medical Department.

The increased production of vaccine during the past few years has been due to the greater strength of the Army, Navy, and the Civilian Conservation Corps. The Army is still pushing forward in this great work of defense against the typhoid bacillus, with results already obtained deserving commendation. The capacity of production in the Army laboratories at present is so organized that over 1,500,000 doses can be made in one week.

The argument is often made that the lowering of the typhoid rate in the Army was just coincidental with that of the general population and due to the improvement of community sanitation. It is undoubtedly true that these factors have lowered the civilian rate for typhoid fever, and to some extent the army rate, but a comparison of the Army rate after compulsory inoculation in 1911 with the civilian typhoid rate in registration areas indicates a far greater reduction of typhoid in the Army. The Army accomplished more in five years than the United States as a whole accomplished in almost thirty years. The Army mortality rate for typhoid fever had been reduced to 3.24 cases per 100,000 by 1915, and this ratio was not accomplished by the civilian population until after 1935. Could the civilian population be subjected to the preventive control of typhoid as practiced in the Army, their rate would soon be reduced to a more favorable proximity of zero.

The Army Pioneers American Bacteriology

The discovery of germs, and the fact that they cause disease, rationalized the practice of medicine and opened the field of preventive medicine and public health. *Bacteriology* became a science of paramount importance. The Army Medical Department in 1893, administered by Surgeon General George M. Sternberg, a pioneer bacteriologist, was in the front line. The department was quick to advance the knowledge and study of preventive medicine. Laboratories were established in all station hospitals during General Sternberg's administration, and he founded the Army Medical School. Since that time the Army has continued to do pioneer work in the field of preventive medicine. Its success in research work is due to the well trained personnel who are permitted to engage uninterruptedly in their investigations. Another fact is that the Army has large groups of men under military control, which facilitates investigation and permits follow-up of results and corrections. When war comes, the clinical field is enlarged with much the same control under full government authority. Consequently the Army Medical Department has been able to make many advances in medicine that have been of outstanding service to humanity.

Surgeon General Sternberg made many researches on pneumonia, malaria, yellow fever, and serum therapy. The Army is still persevering in those same researches step by step, adding daily to the value of bacteriology in medicine. Several agencies of the Medical Department are now engaged in study and research work. A Medical Department Research Coordinating Board was appointed January 15, 1940, to facilitate research problems in the Army.

The Army Studies Pneumonia Prevention

General Sternberg's early study of pneumonia is today being enhanced on a large scale, especially the preventive and protective measures against it. Since 1933 the Army has been producing and distributing pneumococcus vaccine to governmental agencies, and in addition is conducting an experimental measure against pneumonia in the Civilian Conservation Corps. Favorable reports have been made, and the experiment is being continued. In the inoculated groups during 1933 to 1937 the case rate for lobar pneumonia was 79.5 per 100,000 enrollees, and the rate in the uninoculated (control) group was 225.9. During the year 1938 over 271,000 doses of pneumococcus vaccine were supplied to the Civilian Conservation Corps agencies, and a reserve stock of 450,000 was prepared in anticipation of its extended use in the Regular Army. The modern army is not

different from that of the period of General Sternberg. It is digging deep into the wells of knowledge uncovered by the science of bacteriology. The Army realizes the high mortality and incidence of pneumonia and the need of specific preventive measures against it.

The Army Lowers Its Venereal Rate

Recently the public has been able to secure more information and become vitally conscious of the prevalence of venereal disease. The military departments of our government were early promoters of *venereal disease control*. During the Civil War, the venereal rate was 215 cases per 1,000 soldiers in service; during the Spanish-American War there was only a slight improvement. As late as 1909, prior to the institution of voluntary venereal prophylaxis, the rate was 179 cases per 1,000 soldiers. Preventive methods since 1909 have been made compulsory. The soldiers have become better informed as to the physical and mental disturbances from venereal diseases and instructed carefully in the prophylactic measures against them. In addition, drastic disciplinary actions, loss of pay and time, and required prophylactic treatment after sexual intercourse have lessened the incidence of the venereal diseases. The Army administration as a whole has taken part in this control measure, assisting the Medical Department. The cooperative efforts of all branches in this respect have now cut the venereal rate to 34 cases per 1,000 soldiers per annum. It is a hopeful result which is now being increasingly extended to the non-military population. The Army rate will also decrease thereby since the source of venereal diseases in the Army is in the civilian contacts. All venereal cases in the Army are isolated until cured, excepting syphilitics without open lesions who are undergoing controlled treatment. As for the Army, the progress already made does not conclude its efforts to devise a more efficient method in further reducing the venereal rate of soldiers. Though not complete it is a triumph in the field of preventive medicine. It is stated by public health authorities that of the small percentage of the clinic population who seek treatment for venereal diseases in early stages of syphilis only about one-half remain long enough to secure minimum treatment necessary to control syphilis. Could Army control measures be applied it would surely prove helpful.

The Army Strikes the Hookworm

The Army's part in tropical medicine has been executed, in large degree, away from the mainland. Among the island-workers of Puerto Rico in 1900, there existed a "debilitating anemia." An Army doctor, Colonel Bailey K. Ashford, discovered that the disease was due to hookworms and thereby laid the foundation for the eradication of the parasitic infestation. The Army assisted in an active campaign to combat the source of this anemia. Thousands of people were treated, preventing reinfestation of the soil, whereupon Puerto Ricans began to work, live, and enjoy a new health. The discovery made possible the treatment and progress of the inhabitants of our own "sunny" South, and the simple treatment and prophylactic measures used have since been extended to many other countries. Though this fact is not widely known and not as dramatic as many others, nevertheless the Army again brought happiness to countless inhabitants of Puerto Rico, the southern United States, and elsewhere.

The Army Wins With Proper Food

In the Philippine Islands, the Army encountered a disease prevalent among the natives and which frequently appeared among the American soldiers. The disease, altogether too familiar to the Orient, was called *beriberi*. It was usually accompanied by paralysis, tissue wasting, peripheral neuritis, and cardiac disturbances. Death resulted from heart failure. An Army medical officer made an intensive investigation of this disorder, discovering that it was due to eating highly milled or polished rice. He also proved that eating the husk of the rice grain would prevent the occurrence of beriberi, with the result that a rice-eating population was spared many deaths. The discovery of this food deficiency disease led to further scientific work on vitamins which are now common food topics of discussion in every housewives' magazine. Balanced diets and study of essential food elements in the diet were considered in preparing Army rations; the use of polished rice was reduced and meat and unpolished rice substituted. The application of these cura-

tive and preventive measures was soon extended to the diets of all the troops in the tropics, with complete elimination of beriberi in the Army. Colonel E. B. Vedder,¹ Medical Corps, furthered the accomplishments of the Army Medical Department by his fortunate and wise investigations of this deficiency disease. An interesting bit of data about beriberi has been recorded in reference to the Philippine Scouts. In 1909, 604 scouts were admitted to hospitals with beriberi, 50 in 1910, 2 in 1911, and since that year there has been none. Therefore, the Army presents early figures which have since been duplicated by civilians, except that they have not yet quite reached zero. It is highly improbable that the civilian rate will ever be as low, because not all civilians are subjected to as much supervision nor provided with the adequate balanced ration of the soldiers.

The Army Encounters Dengue Fever

Far away from the mosquito-infested island of Cuba, at the other side of the earth, the mosquito carried a dreaded sickness to man. The Army with one of its medical boards began a research on the illness known as "breakbone fever" which was enjoying an epidemic at Fort McKinley, near Manila, Philippine Islands. The disease had previously been confused with yellow fever and malaria. One of the members of this Army board, Colonel Joseph F. Siler,² Medical Corps, worked out in detail the mosquito's act in the transmission of *dengue fever*. Because of the severe bone crushing pain it was and is still known as "breakbone fever." Although rarely a fatal disease, it produced tremendous suffering, the relief from which was welcome. This medical officer's efforts as a member of the Army board resulted in the decrease in the incidence of the disease. The character of dengue fever is now well understood due to the continued work of this board of medical affairs. The board was known as the "Tropical Disease Board."

Army Sanitation is Victorious Over Cholera

The Tropical Disease Board and its members made many additional contributions to the advancement of medicine. *Cholera* was one of the first diseases to demand the attention of the Army and the Medical Department in Manila. The disease was disseminated by the personal habits and the ignorance of the people it affected. China and the Eastern Orient were especially involved. From March 20, 1902 to March 23, 1904, there were 166,252 cases of cholera in the Philippine Islands, from which there were 109,461 deaths. There were probably many cases and many deaths that were not reported. Compare this with the controlled efforts within the Army during the same period: In 1902, there were 485 cases, 286 deaths from cholera; in 1903, 1,479 cases, 96 deaths; and in 1904, one case and no deaths. It was a problem of sanitation, and the Army could control it readily within its own command. The Commissioner of Health, Manila, called on the Army for assistance. Thirty-one officers were detailed to duty, and, in furtherance of the plan, medical officers were made members of the boards of health and sanitation throughout the Islands where they were stationed. The prompt control of the epidemic of such a high mortality rate was another Army accomplishment which adds credit to the advent of western civilization in the Orient. There was one case of cholera, with one death, reported in the Philippine Islands for 1937; no cholera appeared in the United States in 1937. Throughout the world 198,389 cases of cholera, with 101,201 cholera deaths, were reported; 86 per cent of these were in India.

Army Veterinary Service Eradicates Rinderpest

Many years later, about 1928, in the Philippine Islands, an Army Veterinary Officer, Major Raymond A. Kelsner, developed a very successful vaccine against rinderpest. Rinderpest, a highly destructive disease of cattle, was fatal to many of the water buffalo which are beasts of burden in the Orient. The vaccination of the domestic animals of the Philippines with this vaccine soon decreased the disease to negligible proportions. Rinderpest is now rare in the Philippine Islands. The use of the vaccine was extended to other countries where rinderpest was prevalent. In the ten-year period prior to 1926, the annual loss of carabao and cattle from this disease averaged 18,000 animals. Again the

¹ Retired as colonel on October 31, 1933.

² Retired from active service in 1938.

Army through its veterinary service has added a measure in animal immunization that has contributed to the economic development of the Philippine Islands and the Orient.

The Army Believes in Smallpox Vaccination

In one year, in the early eighteenth century, smallpox killed 25,000,000 individuals in Europe. Edward Jenner in 1801 established the value of his discovery of vaccination against smallpox by means of compulsory vaccination in Denmark. But, as time passed, the forgetfulness and the stupidity of the human race had resulted in the discard of preventive measures in Puerto Rico and the Philippines, as in many other places. Smallpox vaccination had been neglected prior to the arrival of the American troops. The disease was endemic and common in both places. The inhabitants were marked with smallpox scars, and the disease was readily disseminated in public areas and vehicles of transportation. Major John Van R. Hoff,¹ Medical Corps, the Chief Surgeon of the Puerto Rican command, put on an active campaign to free the island from this disease by reinstituting controlled vaccination of thousands of its people. Colonel Louis M. Maus,² Medical Corps, as Commissioner of Health in Manila, likewise conducted extensive campaigns of vaccination against smallpox. Success followed the efforts of both these officers, and the uncontrolled scourge was removed from both places, relieving their inhabitants from unnecessary suffering and deaths. It was not because means of prevention were not known, but it took the United States Army to put simple, effective methods into use with imperative precision.

The use of smallpox vaccination in the Army is a routine procedure, and not a single member is omitted. In this connection, it is interesting to note this fact with the percentage of civilians who are vaccinated. Army statistics show that of the first 30,000 civilians enrolled in the Civilian Conservation Corps over 30 per cent were found unprotected from smallpox. This is a serious weakness in American preventive medicine. It has been stated that as the result of this lack of compulsory vaccination the United States continues to occupy second place in smallpox prevalence among the nations of the world. In 1937, 48 states reported a total of 11,673 cases of smallpox, the highest since 1931. But none of these cases occur in the Army. A large proportion of the civilian population has been benefitted by the receipt of smallpox vaccination while they were on active or temporary duty with the Army. The Army has proven that the presence of this unnecessary disease depends upon the extent of the application of vaccination.

Anopheles Falls for the Army

Malaria was a disease well known to the ancient Romans. It was called the "ague," a disease of chills and fevers, by the colonists of North America. The first successful step made toward combatting it was taken in the tropics by the natives, who drank a bitter fluid with the taste of bark. This fluid came from chinchona bark, from which our present active antimalaria element, quinine, is recovered. But that was curative and not preventive medicine. It did not relieve individuals from the suffering they had to endure while having the disease. In 1880, a French Army surgeon in Algeria, Alphonse Laveran, discovered the microscopic animal parasite in the blood of malaria victims. In 1897, Ronald Ross of the Indian Medical Service, British Army, discovered the same parasite in the stomach of the anopheles mosquitoes that had sucked the blood of patients with this disease. This made possible the control of malaria by eliminating the mosquito. Although malarial preventive measures were demonstrated on a small scale in other countries, it was not until the Spanish-American War that they were convincingly demonstrated on a large scale by the American troops. The United States Army soldiers were required to use mosquito nets and to carry on an active campaign against mosquito breeding and destruction. While combatting the breeding of the yellow fever mosquito in Cuba and Panama, the Army at the same time reduced the incidence of the breeding of the Anopheles mosquito. The malarial case rate decreased concomitantly with that of the yellow fever. Since the Anopheles mosquito is more domestic in its habits of breeding

¹Hoff Hall, the school building of the Medical Field Service School, was named in his honor. The use of the building was discontinued in May, 1939.

²Retired as colonel on May 8, 1915. Active duty June 20, 1917 to March 1, 1919.

than the *Aedes aegypti* mosquito, its control is more difficult. Therefore the incidence of malaria cases has not decreased proportionately to that of yellow fever. The Army has made progress in spite of the arduous preventive measures necessary to insure control. Note the following malaria case rates in the Army: In 1901, the rate was 708.52 cases per 1,000 soldiers; in 1902, 272.3 per 1,000; in 1907, 63.19 per 1,000; and in 1927, 6.73 per 1,000.

The rate is declining each year, even though more accurate methods of diagnosing the disease are used. Fifteen varieties of the *Anopheles* mosquito are now known, further confirming the practical difficulties in eradicating the malaria carrier. Malaria causes more disability throughout the world than any other disease. The grouped efforts of medical officers of the Army throughout its jurisdiction have controlled the disease to a great extent. One medical officer, Colonel Charles F. Craig,¹ made many extensive investigations and has written and advanced much information about malaria. To him and the Army as a whole, medicine owes a great deal for the practical knowledge and preventive measures against the disease.

Army Hygiene Controls Dysentery

During the Spanish-American War, one of the chief diseases which afflicted our troops in the tropics was dysentery. Bacillary and amoebic dysentery both played their part. Extensive studies and investigation were made by the Army with the result that much progress was made toward the control of dysenteries. Colonel Craig, in addition to making malaria studies and investigations, included amoebic dysentery, from which much of our present information regarding the disease originated. Colonel E. B. Vedder, Medical Corps, was one of the early advocates of the use of emetine in the treatment of amoebic dysentery. With concerted efforts the Army secured results as is indicated by the following rates: In 1900, the admission rate for dysenteries was 145.13 cases per 1,000 soldiers; in 1901, 82.65 per 1,000; in 1902, 62.03 per 1,000; in 1907, 18.09 per 1,000; and in 1926, .02 per 1,000; and since that time for the entire Army less than 1 per 1,000 per year.

Thus is noted again the rigidity of preventive medicine in the Army, which is difficult to transpose to the civilian population.

The Army Shuts Out the Bubonic Plague

Bubonic plague came under the study and investigation of the Army medical boards. It is a fearful and highly dreaded disease. It confronted the United States Army in the Philippine Islands, prompting the first American studies of this disease. The Board issued a circular about plague in February, 1901, during its extensive outbreak in Manila. Although the transmission of the disease by fleas was not known at the time, nevertheless, by means of supervised sanitary control measures, the disease was kept out of the Army. The epidemic in Manila was controlled by Army medical officers. Since the transmission of the plague by the flea has become known, the campaigns of all governmental agencies including the Army have practically eradicated the disease from America. Two cases of human plague were reported for the United States and its possessions for the period July 1, 1937 to June 30, 1938; one being that of a child in Fresno County, California, and the other, which resulted in death, a Filipino laborer in the island of Maui, Territory of Hawaii. The United States Public Health Service is now carrying on the necessary plague-suppressive measures.

The Dental Corps Curbs Heart Disease

In another field of endeavor the dental officers of the Army have over a period of time made a most welcome progress by reducing the suffering and non-effectiveness which results from valvular heart disease, arthritis, and rheumatism. Diseases of this class in the Army have decreased over 90 per cent during the past 25 years. This decrease has been of marked benefit. Every member of the Army has a dental survey at least once each year; then proper treatment is scheduled and conducted for the individuals having defects. Removal of apical abscesses, curing gum infection, and care of carious teeth and dental

¹ Retired as colonel on October 31, 1931.

cavities have shown progressive health benefits. Note the progress in this field as indicated by admission rates for rheumatic fever: In 1900, the rate was 5.28 cases per 1,000; 1902, 5.22 per 1,000; 1926, 0.53 per 1,000; and since that time less than 1 per 1,000 per annum. The Dental officers, though not heralded with publicity, have quietly and conscientiously assisted the medical officer in efforts to preserve the fighting strength of the Army. In conjunction with the dentists, the medical officers have removed other foci of infection, especially diseased tonsils. It is evident that much success has come from this cooperative work, which will become better understood as the younger generation reaches the arthritic ages.

The Army Advanced the Physiology of Digestion

The first American experimental physiologist was a surgeon in the United States Army. The Army assisted him in carrying out his experiments in the physiology of the stomach, which were the starting point for our modern ideas concerning digestion and dietetics. While stationed at Fort Mackinac in northern Michigan just after the War of 1812, Surgeon William Beaumont was called to treat a young voyager, Alexis St. Martin, who was accidentally shot in the abdomen. Beaumont, familiar with the treatment of gunshot wounds, took the patient into his own home and nursed him back to health. The wound, however, developed into a fistula leading from the stomach to the surface, offering a means of investigation of digestion in the stomach. Beaumont immediately appreciated this opportunity and began a series of careful experiments. Surgeon General Joseph Lovell, then head of the Medical Department, assisted Surgeon Beaumont by having the patient enlisted in the service, so that he could be studied and kept under control without expense to the patient or to William Beaumont. From the careful and experimental investigations, the investigator published his report on "Experiments and Observations on the Gastric Juice and the Physiology of Digestion" in 1825. In this report were described: the appearance of the normal mucous membrane of the stomach; the movements of the stomach during digestion; that gastric secretion occurred after taking food and was not continuous; the observations on the effects of the stomach secretion on various foods; that the digestive juices of the stomach depended on hydrochloric acid and some other substance (later discovered to be pepsin) for their effects. This contribution to American medicine is most noteworthy and was due in no small part to the encouragement that William Beaumont received from his Army colleagues. His patient, Alexis St. Martin, lived an active life despite his fistula until his death at the age of 82 years. The Army doctor is still privileged to carry on individual research and investigation with the encouragement of the Medical Department, in the same manner as in Dr. Beaumont's period of service.

The Army Made America's Greatest Gift to Medicine

There is another contribution worthy of mention, unique in its kind and priceless in value, a heritage of the Army. That is the *Army Medical Library*, an unreplaceable treasure, the loss of which would be felt by the entire world. For over one hundred years, since 1836, the Medical Department has painstakingly accumulated a precious possession and is holding it in trust for the world. It contains approximately a million books and pamphlets published in all parts of the civilized world from the earliest days to the present time, the rarest and most extensive collection of ancient medical books in existence. It is the largest and greatest medical library in the world. The wealth of material within its collection is available to any responsible individual for study. The usefulness of the library is the result of patient and concerted efforts of medical officers who sensed its value to the nation many years ago and to those others who have continued their efforts. The Army Medical Library has rightfully been termed "America's greatest gift to medicine" and "the pride of the medical profession of the United States."

Army Improves Traumatic Surgery

Many other achievements and interesting activities have been accomplished by the Army Medical Department and its members. Medical officers of the World War made numerous advances in surgery and orthopedics. The use of antiseptics in the treatment of wounds led to the use of Carrell-Dakins solution now so well known. In the Civil War

31,978, a ratio of 10.48 per 1000, died from wounds in hospital, and in the World War 13,691, a ratio of 4.5 per 1000.

The Medico-Military Man

Problems will always confront the medical officer as he ventures forth with the Army in conflict or exploration. To plan intelligently it is necessary for him to have a broad general knowledge of military science, so that he may know the principles which regulate the conduct of a campaign. As a member of the unit staff in the field he must have a sufficient military knowledge to insure rendering professional information as may be of valuable assistance in the development of the military plan. Such are his duties in war, and these duties contain many variations and increases from the normal. Herein lies the necessity for continuous military training of the Medical Department Reserve Officer, so he will be able to adapt himself readily, to the military plan.

Probably the most commonly known and spectacular duties of the medical officer involve the care of the wounded in battle. They are not, however, the most important. The preservation of the strength of the command is best maintained by the prevention of contagious diseases and the control of epidemics. History contains many instances where diseases have destroyed armies, and victories have been lost by a scourge of disease rather than the enemy bullets or weapons. The Army doctor must be a good public health officer. He must have a thorough knowledge of camp sanitation, water supply, sewage disposal, food inspection, mosquito control, louse control, and other allied subjects. The professional attainment of the medical officers in the field comes by years of training and experiences in the Army. It is an interesting, useful life of unlimited importance.

The career of the medical officer in the United States Army may not offer so great a financial reward as that of the successful civilian doctor. However, there are compensations for those who wish to advance the general medical science. There is no group of professional men which has accomplished more in this direction than have Army medical officers. Their contributions have been numerous, their efforts sincere and purposeful, of value unredeemable in money. Many diseases which once took a heavy toll of American lives and caused much suffering are becoming almost extinct, because of their experiments, the investigating researches, and practical application of their knowledge. The service of the Medical Department is by no means devoted to the Army itself. The discoveries in preventive medicine, the improvements in sanitation, and the production of vaccines have been extended to the public.

Silent Success

Medical progress is most manifest in the negative—the absence of disease. Today there are many memorials to the building and economical progress of our nation represented in concrete and steel visible to all. But who considers the medical triumphs that were necessary to the existence of these engineering monuments? Take away the preventive medicine now in progress and within a decade the glorious structures with the industries that accompany them would soon be ruins among a land of fearful disease. Yes, the world is a healthier place in which to live and so kept through the relentless effort of preventive medicine. Few realize the efforts which are made by the medical profession as a whole, and altogether too few are acquainted with the role of the Army in this task. A search into historical literature of medicine will convince the investigator that Army doctors of all nations, especially those of the United States Army, have been gallant warriors in the battle against disease. The Army doctors have practiced medicine which deserves due respect indeed. The record of the Army and its Medical Department is an enviable and honorable one. To be associated with this great institution of progress develops a loyalty and sincerity of purpose. Individualism, essential facilities, cooperation, assistance, and the spirit of progress embodies Medical Department members in a united effort. In it they find a position in which they can serve humanity, practice advanced medicine, control and observe results, and carry on biological and clinical investigations on a large scale, thereby making a healthier and happier world for posterity. What else could cope so well with the Oath of Hippocrates?

With varied and numerous duties there is little room for monotony. When the nation's forces are mobilized, the medical officer assumes added responsibilities, coordinating the professional skill and ability of civilian doctors with the Medical Department of the Army. In this era of attack by hostile aircraft upon civilian populations, many medical problems created by such disasters need intensive study and the devising of preventive measures to solve them. It is but an added task to those existing previously. It is a noble work, fulfilling the mission "to conserve the fighting strength of our fighting force" which will permit our citizens to enjoy the liberty and freedom won by the sacrifices of our forefathers.

CHAPTER II

ORGANIZATION AND ACTIVITIES OF THE MEDICAL DEPARTMENT

THE PURPOSE OF THE MEDICAL DEPARTMENT

The Medical Department is responsible for the health of the officers, enlisted men, and animals of the Army. All personnel commissioned or enlisted in the Army must be physically and mentally qualified according to the standards established in the Army Regulations, and the examination must be conducted by authorized members of the Medical Department. The department then endeavors to keep all personnel physically fit during their service and in as nearly normal health as possible upon discharge from the Army. The department also has charge of the veterinary service for the Army animals. To attain this objective the department is constantly engaged in doing research work in order to develop the best that medical knowledge can provide. In short, the mission of the Medical Department is to *preserve the fighting strength* of the United States Army.

COMPONENTS AND DISTRIBUTION OF THE MEDICAL DEPARTMENT

According to the present organization, the Medical Department consists of a Surgeon General, four assistants to the Surgeon General, the Medical Corps, the Dental Corps, the Veterinary Corps, the Medical Administrative Corps, the Army Nurse Corps, the Medical Department enlisted personnel, and a small number of contract surgeons. In addition, the Organized Reserves have a Sanitary Corps.

The officers of the several corps of the Medical Department and its enlisted men are distributed in all military stations throughout the United States, Alaska, and its overseas possessions. They are located at every type of military establishment, including institutions of military education, centers of technical production, and the posts of tactical organizations of troops. The sanitation and health supervision of each station is under the control of a station surgeon, a Medical Corps officer. Officers of the Medical Corps, Dental Corps, Veterinary Corps, Medical Administrative Corps, Army Nurse Corps, and enlisted men of the Medical Department are allotted to each station according to the needs of the garrison and to tactical organizations during field training. To provide medical attention for groups of military personnel not located at army stations, general dispensaries staffed with Medical Department officers and enlisted men are established at these centers of military activity.

Excluding the Surgeon General's Office and the exempted stations and establishments directly under the War Department, the medical activities of the stations are under the control of the respective commanders of the corps areas or departments in which they are located. The administrative control is under the supervision of a Medical Department advisor to the corps area commander, an officer of the Medical Corps known as the *Corps Area Surgeon*. These medical supervisors in the Departments of Panama, Hawaii, Puerto Rico, and the Philippine Islands are known as *department surgeons*. Each corps area and department surgeon has an assistant from the Dental Corps and one from the Veterinary Corps.

THE SURGEON GENERAL

The Medical Department is classified as a "service," in contrast to the "arms." The chief of this service is the "Surgeon General of the Army." He has the military rank of major general, and the assistants to the Surgeon General have the rank of brigadier general. These officers are selected by the President and hold their appointments for a period of four years. The Surgeon General is selected from among the list of colonels of the Medical Corps, and the assistants to the Surgeon General from Medical Department officers having at least 15 years of commissioned service. Three of these assistants are medical officers and one is a dental officer. They are assigned to important positions within the Medical Department.

The Secretary of War promulgates as compulsory regulations the principles and policies

governing the operation of the medical service for the Army, upon recommendation of the Surgeon General who is a technical and administrative staff officer within the War Department. As a staff member of the War Department he is able to establish a unified policy of medical service for all military stations and establishments which is carried into effect as a requirement by all corps area and department commanders through the Medical Department personnel with their respective commands. Those medical establishments which are under immediate control and operation of the Surgeon General are shown in Plate 1.

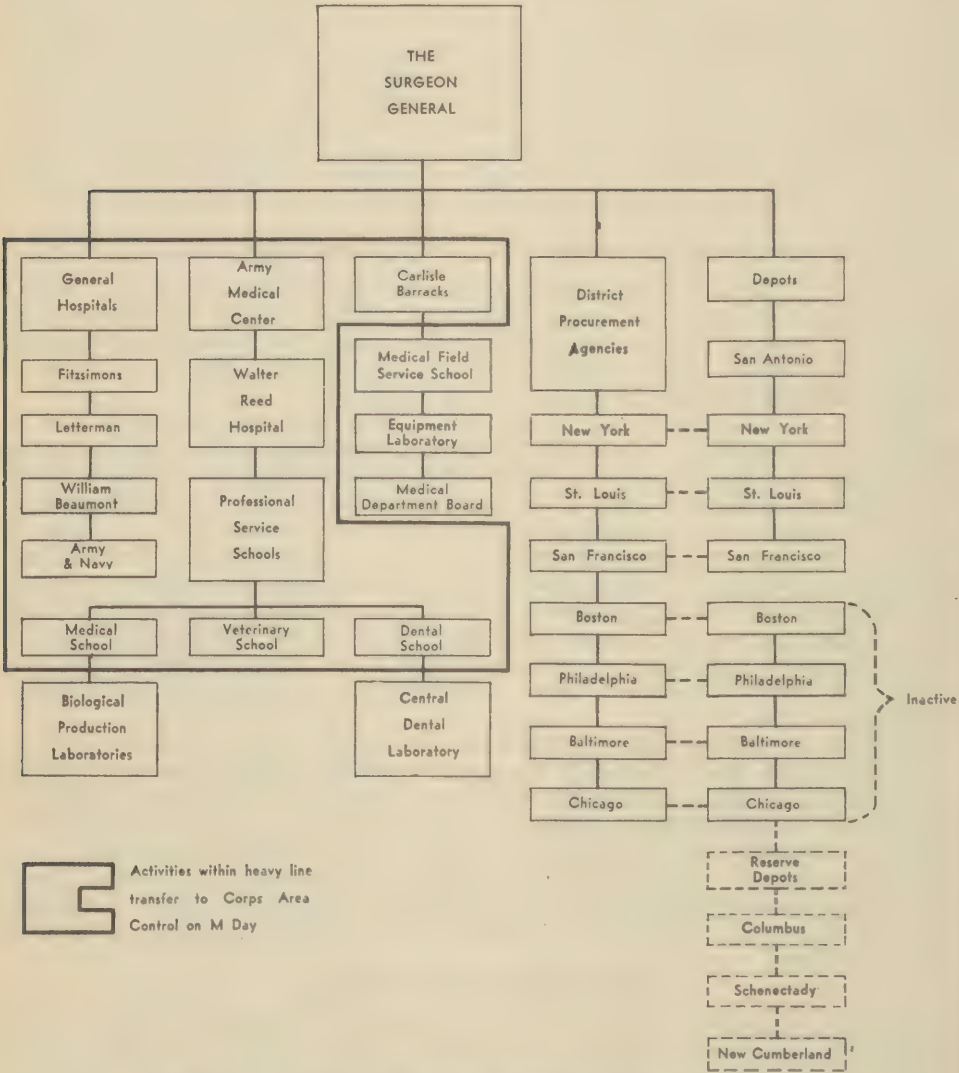


Plate 1. Activities Controlled by the Surgeon General.

THE OFFICE OF THE SURGEON GENERAL

The Surgeon General maintains an office termed "The Office of the Surgeon General," the abbreviation for which is SGO. In this office the policies and practices pertaining to the different functions of the Medical Department, its personnel, and its fiscal matters are elaborated and coordinated within the department and with the other agencies of the army. The relations of this office with corps area and department commanders are

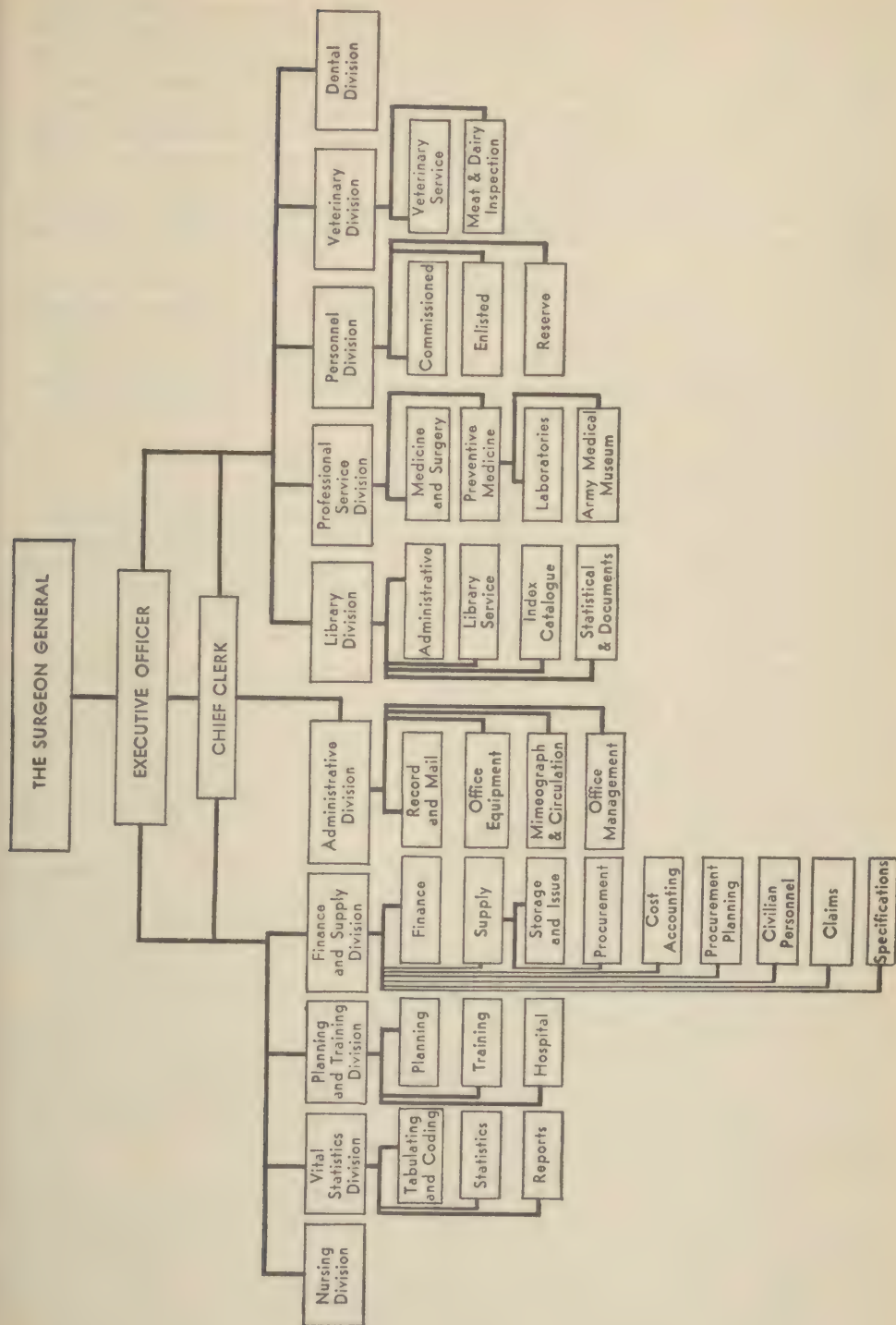


Plate 2. Office of the Surgeon General.

conducted through The Adjutant General's Office of the War Department. Inasmuch as the Surgeon General heads the Medical Department, the divisions and subdivisions of his office functionally include all the activities of the department (See Plate 2). Each major division is organized as a separate division. The activities controlled by the Surgeon General with their relationship to mobilization day are shown in Plate 1. This decentralization of control to the various corps area and departmental medical services is expected to speed up mobilization in event of future emergencies. Certain of these activities under direct control of the Surgeon General in peace time will be transferred to corps area control upon mobilization.

The functions of the medical service of the Air Corps are coordinated by the Surgeon General through the Chief of the Medical Division in the Office of the Chief of the Air Corps.

The personnel of the Surgeon General's office includes in normal times about 30 officers and 175 civilian employees. Approximately ten times that number were employed therein during the World War.

The Executive Officer. The Executive assists the Surgeon General and coordinates the work of all sections. During the temporary absence of the Surgeon General or when authorized to do so the Executive acts as his representative. He is usually a colonel of the Medical Corps.

The Chief Clerk. The chief clerk is a civilian employee with a civil service commission who assists the Executive in carrying out his duties.

The Administrative Division. The Administrative Division directs the routine affairs of the office not specifically assigned to other divisions and coordinates the transaction of business which pertains to more than one division. The subdivisions of the Administrative Division are: *Record and Mail*; *Office Equipment*; *Mimeograph and Circulation*; and *Office Management*. The Office Management Subdivision has chiefly to do with the civilian personnel, supervision of the Hospital Fund, admission to the Army and Navy General Hospital, hospitalization of civilians, and editing of the *Army Medical Bulletin*.

The Division of Vital Statistics. The Division of Vital Statistics is charged with the classification of records relating to sick and wounded which, from an economical and professional standpoint, are extremely valuable and form the basis for the administrative action in regard to claims, awarding of pensions, and disability compensation. It also records medical history of military operations. The division assembles and edits material for the Annual Report of the Surgeon General. The subdivisions of this division are: *Tabulating and Coding*; *Statistics*; and *Reports*.

The Professional Service Division. The Professional Service Division has charge of the management of the professional services of the Medical Department. It evaluates advances in medicine and allied sciences important to the military establishment. This division is composed of two subdivisions: *Preventive Medicine* and *Medicine and Surgery*.

The Preventive Medicine Subdivision has supervision over military sanitation and the control of communicable diseases, except among animals, and includes the operation of the Medical Department laboratories; the administration of the Army Medical Museum; the supervision of special research; liaison with the Quartermaster Corps regarding food supplies, water supplies, waste disposal, insect control, housing sites, and sanitary appliances; liaison with the Public Health Service and other civilian health agencies; formulation of physical standards for military personnel and actions upon reports of physical examination of such personnel; and office action on reports of inspectors general, sanitary inspectors, corps area surgeons, and allied reports.

The Medicine and Surgery Subdivision has to do with the accepted methods of medical practice and the advances made in medicine and surgery, particularly with medical literature. Policies concerning medical practice in the Army are coordinated by this subdivision in cooperation with civilian medical centers and Army general hospitals, station hospital medical services, and the Army Medical School.

The Planning and Training Division. The Planning and Training Division has charge of the development of policies regarding the planning and training activities of the Medical Department and its units, except procurement planning. This division is in

close touch with the War Department General Staff in corresponding subjects. It is divided into three subdivisions: *Planning*, *Training*, and *Hospital*.

The Planning Subdivision is charged with the preparation of war plans, defense projects, tables of organization, and tables of basic allowances for the Medical Department; supervision of experimental development of types of field equipment for individuals and units of the Medical Department; calculation of minimum specifications for occupational specialists, and relative allowances of animal and motor transportation; formulation of manuals, administrative regulations, and legislation pertaining to the Medical Department.

The Training Subdivision is charged with the preparation of policies and plans for the training of the Medical Department of the Regular Army, the Organized Reserves, and Reserve Officers' Training Corps; the preparation of Medical Department training regulations; the supervision of Medical Department special service schools and their extension courses; the authorization of projects for the issuance and distribution of bulletins and other printed matter from the Medical Field Service School.

The Hospital Subdivision is charged with the preparation of plans for hospital construction, changes and maintenance in cooperation with the Finance and Supply Division in peace-time projects and with the Planning and Training Subdivisions on war projects.

The Personnel Division. The Personnel Division administers all matters relating to commissioned, enlisted, and reserve personnel of the Medical Department. It contacts The Adjutant General in the administration of existing policies and the G-1 section of the War Department General Staff in such matters as foreign service tours, quota of personnel for foreign service garrisons and allotments to corps areas, and procurement of personnel. This division is divided into three subdivisions: *Commissioned*; *Enlisted*; and *Reserve*. The Reserve Subdivision exercises advisory supervision over the appointment, classification, and disposal of Medical Department Reserve Officers. It is further divided into five sections: Medical; Dental; Veterinary; Medical Administrative; and Sanitary Corps.

The Finance and Supply Division. The Finance and Supply Division has charge of all finance and supply responsibilities. It is the largest division of the Surgeon General's Office and is concerned with funds necessary for the functioning and operation of the Medical Department. It is divided into the following subdivisions: *Finance*; *Supply*; *Claims*; *Civilian Personnel*; *Cost Accounting*; *Procurement Planning*; and *Specifications*.

The Finance Subdivision prepares estimates of requirements for funds; apportions funds to activities of the Surgeon General's Office; prepares defense of estimates for presentation before the supervising budget agencies and Committees of Congress; maintains a control ledger of all funds appropriated to the Medical Department, funds received from other services, and from the sale of medical supplies and equipment.

The Supply Subdivision is charged with: (1) the procurement; and (2) the storage and issue of medical supplies. The *Procurement Section* is charged with the computation of requirements; adaptation and standardization of supplies and equipment; supervision over preparation of specifications; maintains central record of supply orders and deliveries; and maintains experience tables and computes rates of use. The *Storage and Issue Section* exercises supervision over storage facilities and their proper functioning; makes estimates for and procures additional storage facilities as required.

The Claims Subdivision reviews and approves for payment vouchers for civilian medical, hospital, nursing, and ambulance service for military personnel; reviews and approves for payment vouchers for the emergency purchase of medical supplies; reviews and approves for payment laundry contracts; reviews and audits any other claim that may arise in connection with Medical Department activities.

The Civilian Personnel Subdivision maintains records of civilian personnel of the Medical Department on duty with field agencies; prepares estimates for requirements of civilian employees; assigns, transfers, promotes, and demotes civilian employees; allocates funds to field agencies for payment of civilian employees.

The Cost Accounting Subdivision compiles cost accounts dealing with the operation of the Medical Department and treatment in army hospitals of beneficiaries of other services of the government; also audits all shipping tickets presented to The Chief of Finance

for reimbursement to Medical Department funds for supplies and equipment issued to other services.

The *Procurement Planning Subdivision* figures requirements for mobilization plans; apportions requirements to Medical Department Procurement Planning Districts (See Plate 1); computes war reserve requirements and renders status reports on the same; supervises all procurement planning activities in the field; prepares procurement plans.

The *Specifications Subdivision* is the coordinating agency for the development of both Federal and United States Army Specifications for which the Medical Department is responsible; also furnishes a representative on all War Department Technical Committees.

The Dental Division. The Dental Division supervises matters relating to the profession of dentistry in the army, cooperating with the Professional Service Division. It also is in close cooperation with the Personnel, and Finance and Supply Divisions.

The Veterinary Division. The Veterinary Division has general supervision of the veterinary service of the army, particularly from the professional standpoint, and maintains the necessary liaison with the other divisions of the Surgeon General's Office. It is charged with the inspection of food, particularly meat and dairy products, purchased by the Quartermaster Corps.

The Library Division. The Library Division is charged with the administration of the Army Medical Library. It is divided into four subdivisions: *Administrative, Library Service, Index Catalogue, and Statistical and Documents.*

The *Administrative Subdivision* is concerned with the administrative operation of the Army Medical Library and its coordination with other government and civilian services.

The *Library Service Subdivision* operates a book loan system, comparable to other government libraries.

The *Index Catalogue Subdivision* maintains a catalogue, the key to the library, which lists and keeps up to date comprehensive bibliographies and publications in the field of medical science.

The *Statistical and Documents Subdivision* maintains medical statistics and documents as will be of permanent value to the Medical Department.

The Nursing Division. The Nursing Division has general charge of the procurement and assignment of army nurses and the more intimate responsibilities connected with this service. It has extensive control of the personnel records of the Army Nurse Corps. Liaison is maintained with the Nursing Service of the American Red Cross which is charged with the procurement of reserve nurses for the federal services.

Medical Corps. The Medical Corps is a commissioned component of the Medical Department selected from graduate physicians from Class A medical schools who have completed one year of accredited internship, have successfully passed a rigid physical examination, a competitive professional examination, and have been found by an examining board to possess the necessary aptitude and adaptability for military service. An applicant for the entrance examination must be a citizen of the United States and must be between the ages of 22 6/12 and 30 9/12 at time of examination. (AR 605-10, C1).

All members of the Medical Corps are given a broad basic experience through formal training and duty assignments early in their military careers which qualifies them generally for the usual assignments in the service either in peace or war. This training lies within the fields of preventive medicine, sanitation, medicine, surgery, and field duties. Later, the training tends toward either the professional or administrative duties. With the exception of about ten percent of the Corps, specialization is not exclusive but rather it is additional to practical experience in all duties to which a medical officer may be assigned. A few selected officers of the Medical Corps attend the Command and General Staff School, the Army War College, the Infantry School, the Chemical Warfare School, and the Army Industrial College. Medical officers are also assigned as instructors at these schools.

For each promotion in the Medical Corps an officer is given a professional examination and a physical examination. Failure to meet the physical requirements results in the officer's retirement in the next higher grade. Failure to meet the professional requirement, in the case of junior officers, results in discharge with a year's pay. After the lapse of a year a reexamination is given field officers; should they again fail they are retired in the

grade actually attained. The fixed intervals required for promotion (AR 605-50) are as follows:

First lieutenant.....	upon appointment.
Captain.....	after three years' service.
Major.....	after twelve years' service.
Lieutenant colonel.....	after twenty years' service.
Colonel.....	after twenty-six years' service.
Brigadier general or major general.....	by Presidential appointment in accordance with law.

To provide for the appointment in the Medical Corps of medical students or graduates who have not had the required one year's hospital training, an opportunity is given for such training in Army hospitals, with subsequent appointment in the Medical Corps. This opportunity is open to persons who are otherwise eligible and are students who have satisfactorily completed their fourth year in such "Class A" medical schools as require a year's hospital internship for graduation, and graduates of other "Class A" medical schools who have not completed one year's hospital internship. Application should be made by letter to the Surgeon General, Washington, D. C. (Par 21, AR 605-10).

Such applicants as are found suitable by the Surgeon General will be examined for appointment as hospital internes. The examination will be physical only and will conform in all respects to the standards prescribed by the War Department for the appointment of officers of the Regular Army.

About one month prior to the completion of the internship, the interne will be given a thorough physical examination, the report of which, with the records and reports of his conduct and professional qualifications, together with the recommendations of officers under whom he has served, will be forwarded to the Surgeon General. Candidates recommended as suitable by the Central Medical Department Board and approved by the Surgeon General and the Secretary of War, are upon completion of their internship appointed first lieutenants in the Medical Corps Reserve and are placed on active duty, provided funds for their payment are available.

As soon as practicable thereafter, if approved by the Surgeon General and the Secretary of War, they are appointed first lieutenants in the Medical Corps, Regular Army, without further examination.

The Dental Corps. The Dental Corps is a commissioned component of the Medical Department consisting of graduate dentists. To be eligible for appointment the applicant must be a male citizen of the United States between the ages of 23 and 32, hold a commission in the Dental Corps Reserve, have passed a physical examination and a competitive professional examination. To be eligible to take these examinations the applicant must be a graduate of an acceptable dental school legally authorized to confer the degree of Doctor of Dental Surgery, or its equivalent, have practiced his profession actively for at least 1 11/12 years subsequent to graduation, and be within the age limits of 22 6/12 and 31 9/12 at the time of the examination. (AR 605-15). Application of any eligible person to take these examinations may be submitted to the Adjutant General, Washington, D. C., for reference to the Surgeon General.

The method of promotion of dental officers is the same as described above for officers of the Medical Corps.

Officers of the Dental Corps attend the basic courses of instruction at the Medical Field Service School and the Army Dental School early in their careers; later in their service they are eligible to attend the Advanced Graduate or Specialists' Courses at the Army Dental School. Selected officers are sent to civil institutions for special instruction.

The Dental Corps conducts the dental service for the Army, preserving and promoting the dental health of all military personnel. The dental officer is governed by a definite policy of treatment applied to classified patients in order that he may accomplish the greatest good for the group. The secondary mission of the Dental Corps is to assist the Medical Corps during combat. In addition to their dental services they assist in first aid, evacuation, and such other emergency activities as may be required.

The senior dental officer of a command is known as the "dental surgeon." Dental officers are assisted in their work by enlisted men of the Medical Department, trained locally or through special courses conducted at the Army Dental School as dental assistants.

The Veterinary Corps. The Veterinary Corps is a commissioned component of the Medical Department consisting of graduate veterinarians. Its candidates enter the corps by examinations similar to those of the Medical and Dental Corps. The applicant for examination must have the degree of Doctor of Veterinary Medicine or its equivalent from an acceptable veterinary college requiring a four year course for graduation. The applicant must be between the ages of 21 and 29 9/12 years at the time of examination. (AR 605-20).

The promotion scheme is the same as for the Medical and Dental Corps. The grade of colonel is the highest to which appointments have been made.

Early in their service they are sent to the basic course of instruction at the Medical Field Service School and to the Army Veterinary School. Later they may attend the Advanced Graduate and Specialists' Courses at the Army Veterinary School, and, occasionally, selected officers are sent to the Cavalry School.

The Veterinary Corps conducts the veterinary service for the Army. Their duties involve the preservation and promotion of the health of Army animals and the inspection of dairy and meat products purchased for the Army. This inspection of foods is to determine whether or not they comply with federal specification requirements and War Department contracts under which they are purchased by the Quartermaster Corps.

The Sanitary Corps. The Sanitary Corps, which is a Medical Department Reserve Corps, comprises individuals having skill in sciences and vocations technically allied to the functions of the Medical Department, such as chemists, food and nutrition experts, hospital architects, producers of medical supplies, psychologists, public health specialists, and sanitary engineers. For appointment requirements, see Officers' Reserve Corps.

The Medical Administrative Corps. The Medical Administrative Corps is now chiefly composed of officers who prior to appointment were experienced noncommissioned officers of the Medical Department. Since June 24, 1936, original appointment has been restricted to pharmacists between the ages of 21 and 32 who are graduates of acceptable schools or colleges requiring four years of instruction for graduation and are legally authorized to confer the baccalaureate degree in pharmacy. The applicant must pass a physical examination, take a competitive professional examination, and satisfy the examining board as to his moral character and general fitness for military service. Candidates who are found qualified by the Central Examining Board, upon recommendation of the Surgeon General and approval of the Secretary of War, are appointed second lieutenants in the Medical Administrative Corps.

These officers are eligible for promotion to the grade of first lieutenant after five years' service and to the grade of captain, the limiting grade, after a total of ten years' service. Promotion is subject to physical examination. They attend the basic course of instruction at the Medical Field Service School. The newly appointed pharmacist may be assigned to duty as a student at a civilian institution for special instruction.

Medical Administrative Corps officers assist in the administrative affairs of the Medical Department in such capacities as medical supply officers, registrars, detachment commanders, and mess officers. Qualified pharmacists may be assigned to manage a hospital pharmacy or other duties which pertain to their profession.

The Army Nurse Corps. The Army Nurse Corps consists of female nurses having the following grades, with relative rank, in order of importance: Nurse (relative rank of second lieutenant), Chief nurse (relative rank of first lieutenant), Assistant director (relative rank of captain), Director (relative rank of captain), Assistant superintendent (relative rank of captain), and Superintendent (relative rank of major). (AR 40-20).

Appointments in the Army Nurse Corps are made by the Surgeon General with the approval of the Secretary of War from among physically qualified, registered female nurses who are citizens of the United States, between 22 and 28 years of age, unmarried, and graduates of acceptable high schools and schools of nursing giving at least a two years' course of training in a general hospital with a daily average of 50 patients or more,

including men, women, and children, during the applicant's training period. They have the relative rank and the rights and privileges of commissioned officers with the exception that their pay and allowances are on a different scale. Upon original appointment, members of the Army Nurse Corps are given the relative rank of second lieutenant.

Promotion to the higher grades to include major is determined by length of service and selection. Any nurse who has had three years of active service in the Army may request examination for promotion.

Army nurses are stationed in medical establishments according to the needs of the service. (Par 5, AR 40-20). Their duties are similar to those of a civilian nurse in hospitals of like character.

Contract Surgeons. In emergencies civilian physicians may be employed as general (full-time) or special (part-time) contract surgeons under contracts entered into by the Surgeon General with the approval of the Secretary of War. The professional and administrative duties of a contract surgeon are the same as those of an officer of the Medical Corps, except in so far as they are limited by the fact that the contract surgeon does not perform his functions by virtue of military rank or commission. Employment as a contract surgeon is limited to graduates of reputable medical schools legally authorized to confer the degree of doctor of medicine. He must be a licensed practitioner of medicine in good standing at the time the contract is made. He must also, in the opinion of the contracting officer, possess satisfactory moral, professional, and physical qualifications. (AR 40-30).

Pay and allowances are the same as commissioned officers in the second pay period. A part-time contract stipulates the compensation in the contract. (AR 35-1920 and AR 35-4820).

Officers' Reserve Corps. The Medical Department Reserve consists of a body of civilians qualified and willing to serve as officers of the various corps of the Medical Department in time of war. They have been given appropriate commissions and assignments in preparation for such service.

The sections of the Officers' Reserve Corps pertaining to the Medical Department are as follows: Medical Corps Reserve, Dental Corps Reserve, Veterinary Corps Reserve, Sanitary Corps Reserve, and the Medical Administrative Corps Reserve. The missions of the several corps and the qualifications of their members are analogous to those of the corresponding Corps of the Regular Army. The Medical Administrative Corps Reserve is selected from candidates who have had experience in administrative duties comparable to those performed in medical units and establishments.

Candidates for a reserve commission must be citizens of the United States and must pass a satisfactory physical examination. Those entering the reserve components of the Medical Department in the initial grade must be within the age range of 21 to 35 years at the time of appointment. All candidates who meet the requirements are appointed initially as first lieutenants and are eligible for promotion to colonel, with the exception of the Medical Administrative Corps Reserve appointees who receive the initial grade of second lieutenant and are eligible for promotion to the grade of captain only. Appointments are for five years at which time the commission is renewed subject to physical examination and an established record of qualification for the duties of his grade.

Active duty training is given Reserve officers as funds appropriated by Congress permit. They are usually sent to summer camps or maneuvers for two weeks, during which time they receive the full pay and allowances of their grade. Inactive duty training (without pay) may be taken by Medical Department Reserve officers in the form of two-weeks' courses, embracing combined clinical and military instruction, which are offered at certain civilian medical centers. Army Extension Courses are furnished in the form of correspondence courses. On completion of the respective requirements of correspondence courses, certificates of capacity are given, making them eligible for appointment to the next higher grade upon completion of prescribed periods of service in grade.

Reserve officers do not receive retirement and retired pay although they are accorded pension rights for disability incurred in line of duty during active service in time of war. At the age of 64, all Reserve officers are placed in the Inactive Reserve.

The Reserve Officers' Training Corps. The medical branch of the Reserve Officers' Training Corps is composed of a group of medical students in certain selected medical schools of the country pursuing courses of instruction prescribed by the War Department to prepare them for commission in the Medical Corps Reserve of the Army.

The maintenance of these instruction units at civilian institutions is authorized by Section 40-47c of the National Defense Act as amended, and in their operation the War Department and the institution assume a joint responsibility. An officer of the Medical Corps, Regular Army, is assigned at each school to conduct the instruction. The school insures a membership of at least fifty students, provides for ninety hours of instruction per year, and makes the basic course, when entered upon, an academic requisite for graduation, unless the student is released. Membership in these units is voluntary.

The 23 institutions which in the fiscal year 1940 maintained medical units of the Reserve Officers' Training Corps are: Boston University, University of Vermont, Cornell University Medical College, Syracuse University, University of Buffalo, Georgetown University, George Washington University, Jefferson Medical College, University of Pennsylvania, University of Pittsburgh, Medical College of Virginia, Vanderbilt University School of Medicine, Indiana University, Ohio State University, Western Reserve University, University of Michigan, the State University of Iowa, University of Minnesota, St. Louis University School of Medicine, Washington University, Baylor University, University of Oregon Medical School, and the University of California.



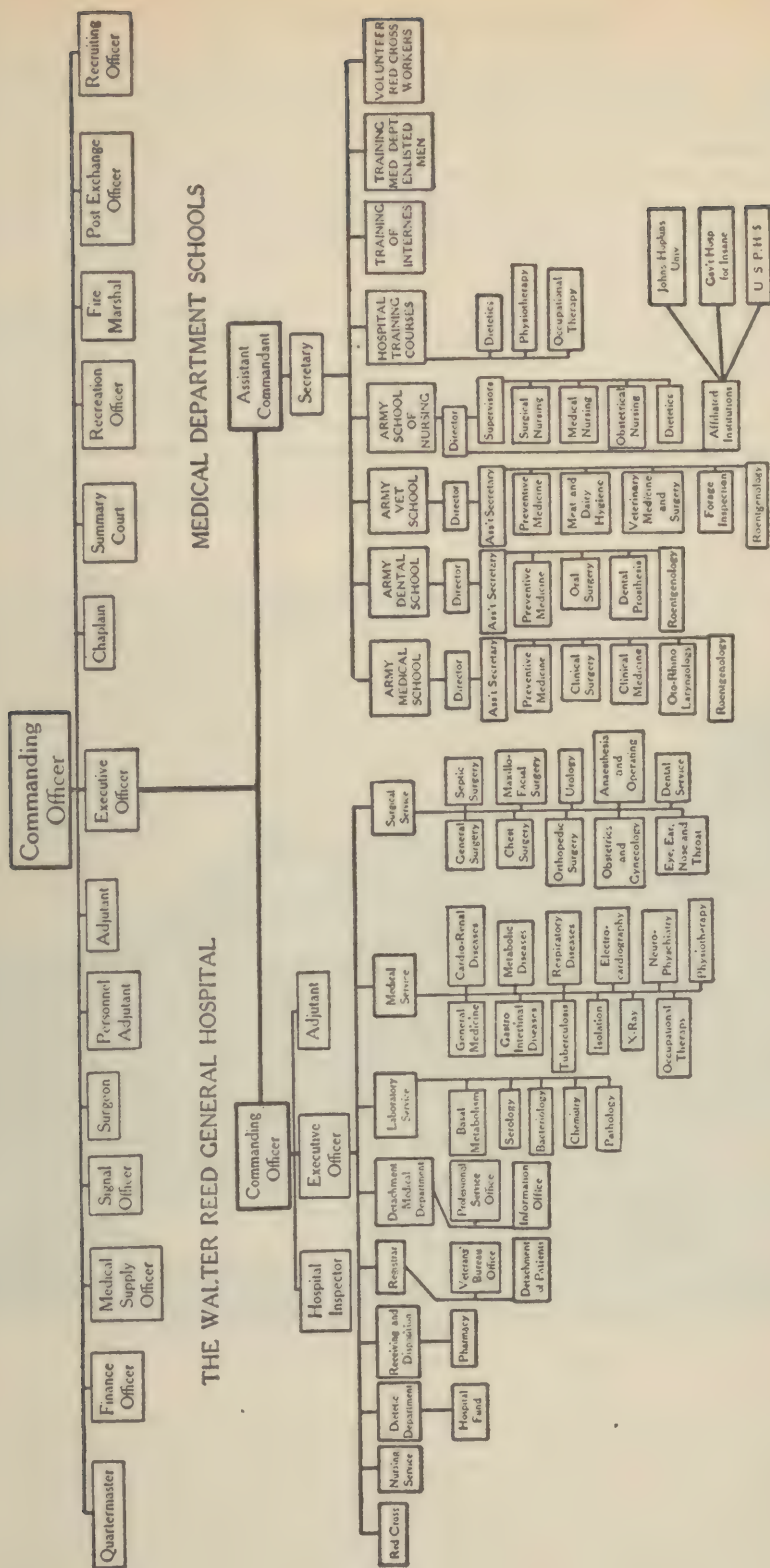
Plate 3. The Army Medical Center.

The prescribed courses of instruction extend through the four years of the medical school curriculum, the first two years constituting the Basic Course and the last two years the Advanced Course. A summer training camp period of six weeks is also required. Enrollees in the advanced course, which carries a nominal rate of compensation, are selected from students who have successfully completed the basic course.

A medical student cannot be enrolled in the Reserve Officers' Training Corps unless he is a citizen of the United States and is physically qualified for military service. Upon graduation from the Advanced Course and recommendation by the Professor of Military Science and Tactics and the school authorities, he is granted a commission in the Medical Corps Reserve of the Army.

THE ARMY MEDICAL CENTER

In 1923, during the administration of Surgeon General Merritte W. Ireland, the War Department issued orders directing that Medical Department facilities in the Takoma



Park section of the District of Columbia be known as "*The Army Medical Center, Washington, D. C.*" Its purpose was to place in one location the clinical facilities for the professional care of sick and injured, the training schools for medical department personnel, and the equipment for research and the manufacture of biological products.

The center was established in 1923 and continues to fulfill the purposes for which it was created. It consists of the Walter Reed General Hospital, The Army Dispensary, the Army Medical Department Professional Schools, and the biological laboratories. This need for a centralized military medical establishment was realized during the World War.

It is located in Washington, D. C., in a beautiful landscaped area of 110 acres about 6 miles northwest of the Capitol. This location provides close coordination with the Surgeon General's Office, the Army Medical Museum, and the Army Medical Library.

Command and Organization. The Army Medical Center is commanded by a brigadier general of the Medical Department. The Assistant Commandant, a colonel, has charge of the schools and training. The hospital has a commanding officer responsible for its internal administration. The Commanding General, in addition to medical personnel, has on his staff, officers of the Quartermaster Corps, Finance Department, and representatives of the Signal Corps and Ordnance Department.



Plate 5. Walter Reed General Hospital.

Walter Reed General Hospital. The Walter Reed General Hospital was built in 1908 and named in honor of Major Walter Reed, Medical Corps, United States Army, because he proved the means of transmission of yellow fever. It is a general hospital equipped to treat all types of cases, including diagnosis and treatment of acute and chronic diseases as well as injuries. It has a capacity of 1,200 beds, which are about equally divided between medical and surgical. The daily average for beds occupied is approximately 1,000, of which 500 are military, 350 are for the Civilian Conservation Corps, and 150 for vet-

erans of the World War. Women and children who are dependents of military personnel are admitted to the hospital when beds are available. Each year approximately 7,500 patients are admitted to the hospital; of these 45 per cent are medical and 55 per cent surgical.

During the year 1939, the *Army Dispensary*, formerly in the Munitions Building of the War Department, was transferred to the Army Medical Center. This dispensary handles a large outpatient clinic since so much military personnel is stationed in and near Washington, D. C. Its location in the Army Medical Center permits utilization of the most modern methods of diagnosis and treatment, facilitated by available laboratory means and adequate equipment.

The Medical Department Professional Service Schools are located in buildings separated from the hospital. They include the *Army Medical School*, the *Army Dental School*, and the *Army Veterinary School*. These schools are conducted solely for the special training of Medical Department officers and soldiers.

Regular courses are given for young physicians, dentists, and veterinarians recently commissioned, and *advanced courses* are given for officers of longer service. *Individual training* is available for those specializing in various branches of medicine, surgery, and public health.

Courses for Medical Department soldiers include X-Ray and laboratory technic, oral hygiene, dental mechanics, and food and forage inspection.

Under direction of the schools, but conducted in the hospital itself, there are courses for young women in dietetics and physical therapy. Selected Army Nurses are trained in the field of *anesthesia*.

The organization and command of the Medical Department Professional Service Schools are so established that separate faculties are provided for the Medical, Dental, and Veterinary Schools. All these schools are coordinated by the Assistant Commandant. Many of the officers on duty at the Walter Reed General Hospital are members of the faculty. The facilities of the hospital are available for the instruction of students of the school. An average of 75 officers graduate yearly from the Medical Department Professional Service Schools. These Professional Service Schools also graduate annually approximately 50 enlisted men in Roentgenology technic, 40 in Clinical Laboratory technic, 30 in Dental Mechanics and Oral Hygiene, and 10 in Veterinary technic and Food and Forage Inspection.

The Biological Laboratories. The biological laboratories, in addition to furnishing a valuable accessory to teaching for the Professional Service Schools, do routine laboratory work for the hospital, for the Third Corps Area, and special work for the entire Army. They manufacture various biological products and supply typhoid vaccine for all the federal medical services. The major research work of the Medical Department is conducted in these laboratories. They are equipped with the most modern sterilizers, incubators, and refrigerators to insure sterility and the preservation of biologicals which are essential to the military service. The biological production laboratory is prepared to meet the requirements of a maximum mobilization. The capacity of production is such that over 1,500,000 doses of typhoid vaccine can be made in one week. The laboratories also collaborate with civilian and other federal laboratories in the field of research.

MEDICAL FIELD SERVICE SCHOOL

Purposes of the School. The purposes of the Medical Field Service School are: the training of officers and enlisted men of the Medical Department of the Army of the United States in the principles and methods of medical field service so as to increase their ability as instructors and fit them for their command and staff duties; the development of new methods of medical field service and research study of new equipment and appliances to be used by the Medical Department.

Location and History. On May 15, 1920, the War Department authorized the establishment of the Medical Field Service School at Carlisle Barracks Military Reservation as a means of providing field training for Medical Department officers and enlisted men. The school was established in 1921. Carlisle Barracks is just north-east of the city limits of Carlisle, Pennsylvania. One of the oldest American military

posts, it was established by the British Army in 1757. It has been the scene of important events in wars fought by the United States from the American Revolution, during which it was a depot and munitions works, to the World War, when, during 1918-1919, it was used as General Hospital Number 31. From 1879 to 1918 it was occupied by the Carlisle Indian Industrial School. Since the World War, Carlisle Barracks has remained under the control of the War Department. It is a Medical Department post with a medical officer in command.

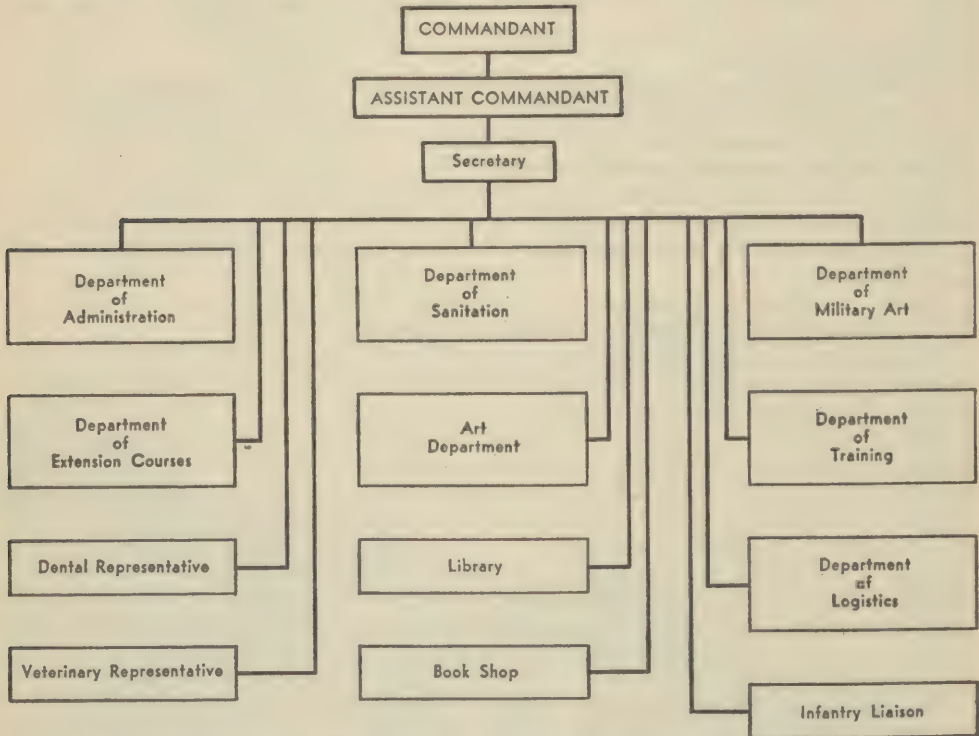


Plate 6. Organization of the Medical Field Service School.

Many of the buildings used for housing the school facilities were formerly used by the Carlisle Indian Industrial School. Some were constructed during the period of the Revolutionary War and others immediately following the Civil War. A building program is now under way to provide the necessary buildings and utilities to fulfill the needs of the school. Additional buildings and facilities are also being provided for the operation of an increased quota of Officers' Reserve Corps and Reserve Officers' Training Corps trainees.

Command and Organization. The school has the same organization as the special service schools of the arms and other services. *The Commandant* commands the post and all of its troops and installations. *The Assistant Commandant*, usually a medical officer of the rank of colonel, supervises the conduct of the various courses and the administration of the school departments. The staff of the Commandant includes a number of officers and an enlisted detachment of the Medical Department, a chaplain, officers and men of the Quartermaster Corps, and small enlisted detachments of the Signal Corps, Finance Department, and Ordnance Department.

School Departments. The Medical Field Service School has the following instructional departments: Administration, Military Sanitation, Military Art, Training, Logistics, and Extension Courses. Each instructional department is headed by a Director. In addition to the Medical Department officers of the faculty there is an Infantry officer assigned as liaison officer and instructor. The faculty consists of especially trained officers, many

of whom are graduates of the Command and General Staff School and of the Army War College. Members of the Dental, Veterinary, and Medical Administrative Corps are also represented on the faculty and conduct classes in subjects pertinent to service in their respective corps.

The school also has three activities which facilitate the instruction: The School Library where military and medical publications are available for instructors and students; the Art Department which prepares overlays, charts, diagrams, and allied instructional materials; and the Book Shop. These activities are under the supervision of the Assistant Commandant.

The instructional departments have specific objectives in reference to the training and instruction of junior (newly commissioned) Medical Department officers:

Military Art. To instruct student officers in:

Practical application of map reading and aerial photography.

Principles of war, and the characteristics of the various arms in the Infantry, Cavalry, and Armored Divisions.

Organization, equipment, tactics and technique of Medical Department units in the Infantry, Cavalry, and Armored Divisions.

The technique of combat orders: formal, dictated, oral, and administrative.

General principles of aviation medicine.

General principles of Chemical Warfare Defense.

Military Sanitation. To instruct student officers in:

Responsibilities of the Medical Department in health matters and the general principles of the control of communicable diseases.

Methods and systems of control of communicable diseases as exercised by public health authorities.

Proper methods employed in environmental sanitation.

Methods of making a medical inspection of a small command and in the writing of sanitary orders for a regiment in the field or a regimental post in peace.

Training. To instruct student officers in:

The principles and management of training.

The proper conception of uniform standards.

The approved methods of training and attainable standards of proficiency.

The use of field equipment of the Medical Department.

War Department plans for the mobilization of the manpower and industries of the nation.

Animal management and equitation.

The technique of preparing and delivering short talks.

Logistics. To instruct student officers in:

The principles and methods of supply of troops in the Infantry, Cavalry, and Armored Divisions.

The principles and methods of movement of troops of smaller units.

Administration. To instruct student officers in:

The customs of the service.

General administration of the military service.

Administration of the medical service.

General knowledge of military law and the administration of military justice.

Extension Courses. To instruct Regular and Reserve officers by correspondence courses for the purpose of:

Giving progressive, theoretical, inactive-duty training to personnel of the Medical Department.

Prepare such personnel to perform efficiently their duties immediately incident to mobilization.

Provide a foundation for active-duty training.

Dental. To instruct dental officers in:

The principles and technique of dental administration in post, camp and in the field.

The principles and technique of dental service in the field.

The proper treatment of maxillary fractures in the field, and in post or camp.

Veterinary. To instruct veterinary officers in:

The principles and technique of veterinary administration in camp and in the field.

The principles and technique of veterinary sanitation.

The tactics and technique of veterinary service with the infantry and cavalry regiments and divisions, and field artillery units.

Training Courses. There are several distinct courses of instruction normally conducted by the school. These courses are so arranged that field training will be made available to the maximum number of Medical Department officers and for the specific needs of those who attend the school.

The *Basic Course* is designed for newly commissioned Regular officers of the Medical, Dental, Veterinary, and Administrative Corps of the Medical Department. This period of training is normally conducted each year for five months, commencing about January 15 and ending in June. It includes basic principles of field service, field sanitation, training management, and Medical Department administration.

The *Advanced Course* is for selected field officers of the Medical Department who receive three months of training in medical tactics and related subjects of large army units. This course normally begins about September 15 each year and ends in December. Many of the officers who complete this course are then assigned as instructors with the National Guard and Organized Reserve units.

The *National Guard and Organized Reserve Officers' Course* is a two-months' course, usually beginning about September 15 of each year and ending in November, for selected officers of the Medical Department from the National Guard and Organized Reserves.

The *Noncommissioned Officers' Course* begins about September 15 of each year and ends November 15. This two-months' course is designed for noncommissioned officers of the Medical Department of the Regular Army and the National Guard, to instruct them in their field duties and Medical Department administration.

The *Enlisted Sanitary Technicians' Course* of one months' duration is conducted during the school year when such courses are required. Several classes during the year may be conducted. Students are especially trained in field sanitation.

Army Extension Courses are offered by the school to certain Regular and Reserve officers and enlisted men of the Medical Department whose duties will not permit them to attend the School.

A *Medical Reserve Officers' Training Corps* camp is conducted for a period of six weeks during the months of June and July each summer at Carlisle Barracks.

The *Officers' Reserve Corps* of the Medical Department has two 14 day training periods, one during the month of June and the other during the month of July of each year.

Attendance at Courses. The average attendance at these various periods of instruction is as follows:

The Basic Course	60 to 80
The Advanced Course	15 to 25
The National Guard and Organized Reserve Course	10 to 20
The Noncommissioned Officers' Course	75 to 100
The Enlisted Sanitary Technicians' Course	15 to 25
The Reserve Officers' Training Corps Camp	250 to 500
The Officers' Reserve Corps Camps	500 to 600

The average total of the above indicates that about 1,000 officers and enlisted men of the Medical Department, including the National Guard and the Organized Reserves, are actively trained in medical field service annually.

Demonstration Troops. Demonstration troops of medical department personnel are stationed at Carlisle Barracks to conduct demonstrations and assist in teaching the tactics of medical field service. The presence of these troops provides an excellent opportunity for the student Medical Department officers to assume command during school maneuvers and field exercises.

The Medical Department Equipment Laboratory. The Medical Department Equipment Laboratory was established on October 1, 1920, for the purpose of providing an experimental laboratory for producing, testing, and determining the serviceability of medical equipment, especially the equipment used in medical field service. It has developed many of the appliances and apparatus used by the Medical Department of the Army, and new models of equipment, transportation, and other devices are constantly being studied. This activity functions under a Director, who is a Medical Department officer.

The Medical Department Board. The Medical Department Board is stationed at Carlisle Barracks and operates under the direction of the Surgeon General. It consists of the Commandant and Assistant Commandant of the Medical Field Service School and from three to seven officers designated by the Surgeon General. The Board considers and reports on such subjects as may be referred to it by the Surgeon General. It also originates and submits to the Surgeon General recommendations for the improvement of the Medical Department, especially policies relating to service in the field.

The Medical Field Service School Book Shop. The Book Shop is one of the essential activities of the Medical Field Service School. It is an agency through which all Army personnel may purchase necessary materials, text books, and instructional matter as needed in their training activities. A list of publications available will be furnished upon request.

THE ARMY MEDICAL LIBRARY

The Army Medical Library is a treasure house of classified medical information available to students of medicine throughout the world. It is the most precious possession of the Medical Department of the United States Army, and as expressed by Professor William H. Welch of Johns Hopkins School of Medicine "America's greatest gift to Medicine." It contains more than a million items and is the largest medical library in the world.

History. The Army Medical Library was called until 1922 the Library of the Surgeon General's Office. It was originally a small collection of reference books for the use of Surgeon General Joseph Lovell (1818-1836) and was kept in his office in Washington. In 1840 a manuscript catalogue listed 228 volumes; at the outbreak of the Civil War in 1861 the number of volumes was between three and four hundred; on May 10, 1864, a printed catalogue showed a total of 1,365 volumes; and in another printed catalogue of October, 1865, the number had increased to 2,258. Colonel John Shaw Billings, Medical Corps, is given credit for being the creator of the library. He was placed on duty in the Surgeon General's Office in 1865, and he took a deep personal interest in the establishment of a source of medical information for Medical Department officers. He was the official librarian from 1868-1895. In 1868 the sum of \$80,000 was made available from funds left over from the Civil War hospitals, and Colonel Billings was given authority to expand the library.

On June 12, 1868, a printed catalogue showed 6,066 volumes; in 1871 the number had doubled to 13,380; in 1873, 25,000 volumes and 15,000 separate pamphlets; in 1876, 40,000 volumes and 40,000 pamphlets; and in 1895, when Colonel Billings retired, the number had increased to 308,445. At the present time the Army Medical Library contains over a million books, pamphlets, theses and manuscripts. Many rare books are in the collection, including 450 of the existing 600 medical *incunabula* or books published before A. D. 1500. Besides books, pamphlets, and these valuable collections, the library has five thousand portraits of medical men, and a collection of medical autographs.

Location. The Army Medical Museum, which housed the Army Medical Library from 1865 to 1887, occupied the Old Ford's Theatre, Washington, D. C., in which Abraham Lincoln was assassinated. In 1887, the Army Medical Library and the Army Medical Museum were moved to larger quarters at the corner of Seventh Street and "B" Street (now Independence Avenue), S. W., Washington, D. C. It still remains at this site. A bill was passed by Congress and approved by the President June 15, 1938 authorizing \$3,750,000 for the construction of a building to replace the present Army Medical Library and Museum. The funds have not been made available as yet.

The Index-Catalogue. The Index-Catalogue began in the mind of Colonel John Shaw Billings when from his experience in 1860 he realized the need for such a bibliography. The catalogues published in 1872 and 1873 led to definite proposals in 1876, when a catalogue was submitted to universities, libraries, and medical men for criticism and suggestions. The catalogue was received with high favor. It was arranged under both authors and subjects, practically the same style as adopted later in the Index-Catalogue. The *first series* of the Index-Catalogue was published in 1880, when Congress made the first appropriation for this purpose. It indexed 85,663 author titles, 151,504 titles of pamphlets, subject titles of 168,587 books, and 511,112 journal titles. Sixteen volumes came out yearly from 1860 through 1895. The *second series* consisting of 21 volumes was issued between 1896 and 1916. The *third series*, consisting of ten volumes and indexed medical literature to include the year 1925, was compiled between the years of 1918 and 1932. The *fourth series* is now under compilation, the first volume of which was issued in June, 1936. The abbreviations are shortened; the volume numbers are in Arabic instead of Roman; and the use of eponymous titles in nomenclature of diseases is avoided as much as possible.

The Index-Medicus. The history of the Index-Medicus is herewith included because it has so often been confused with the Index-Catalogue with which it was closely related as an immediate supplement for a long period. It has never been an official government periodical and depended upon financial support from its sales. Starting in January, 1879, a year before the first volume of the Index-Catalogue appeared, it came out monthly until May 1899, when it met financial ruin. Three more volumes were published between 1900 and 1902 in Paris under the title *Bibliographia Medica*. In 1903 the Carnegie Institution of Washington with Colonel John Shaw Billings as vice-chairman of the Board of Trustees revived the Index-Medicus and it continued until 1927, when it was amalgamated with the "Quarterly Cumulative Index Medicus" of the American Medical Association, both of which are continuing to give their support. Although the Army Medical Library continues to assist in the compilation of necessary literary facts, the Army gives no financial support to the publication.

The Army Medical Library Centenary. On the 16th of November, 1936, the 100th anniversary of the founding of the Army Medical Library was commemorated at the Army Medical Library, Washington, D. C. Men whose names are known to every student of medicine came from distant parts of the world to celebrate an important advance in medical knowledge. Universities, scientific institutes, academies, hospitals, and libraries sent representatives. It was an important and significant occasion to commend the United States Army Medical Department for the most extensive collection of publications in the realm of medical science that mankind has ever known. The Army Medical Library and its Index-Catalogue is according to an editorial in the *Journal of the American Medical Association*, the "Pride of the Medical Profession of America."

THE ARMY MEDICAL MUSEUM

History and Origin. The Army Medical Museum had its origin in 1862 during the Civil War. It was originally created for the purpose of preserving specimens which would be illustrative of war wounds and of war diseases which produced death and disability. Most of the early collections came from the battlefields of the Civil War. Gradually the collection was extended to include all forms of injuries and disease, and at the present time it is a general pathologic museum accessible to scientists and research workers for study. It also is an educational exhibit for the public.

Organization and Location. The Army Medical Museum is a part of the Professional Service Division of the Surgeon General's Office. It is housed in a large three-story building with the Army Medical Library at Seventh Street and Independence Avenue, S. W., Washington, D. C. This building was completed in 1887 at a cost of \$200,000. The Army Medical Library and the Army Medical Museum have both made such a rapid growth that construction authorization has been granted for a new and adequate building.

Purpose of the Army Medical Museum. It is the central laboratory of pathology for the Army and the national museum of the American Dental Association. Under the auspices

of the National Research Council and the American Medical Association, it is the depository of the American Registry of Pathology.

Contents of the Army Medical Museum. The total number of accessions is over 125,000 of which about 40,000 consist of medals, figures, photomicrographs, and actual tissue dissections of embryology, normal anatomy, histology, pathology, history of medicine, dentistry, and veterinary medicine. In May, 1939, one of the largest and most valuable collections of wax anatomical specimens in the world was added to the Army Medical Museum. (This was the George S. Huntington collection, presented to the Army Medical Department by Columbia University Medical School.)

Some of the other outstanding exhibits are the medical medals, the section on ophthalmic pathology, the section on fracture of bones, the famous microscope collection, and the world's largest collection of war wounds, showing the effects of arrows, tomahawks, small arms, high explosive shells, and war cases.

This museum is an important and valuable adjunct to the Army Medical Library and like the library is an educational treasure whose value is appreciated as much by the professional public as by the Army Medical Department.

CHAPTER III

FIELD SANITATION

Definition. Sanitation is the art by which we adjust our living conditions in accordance with the laws of hygiene. Methods of application of sanitary art may change—the simplest effective methods are the best. Sanitation as applied to the military is shaped according to the environment in which the military situation occurs. In this chapter emphasis is placed on the sanitation of the forces in the field and in camps rather than in peacetime garrisons. Because of the advancement of preventive medicine and sanitary engineering, sanitation in garrisons has become similar to the public health control of large metropolitan communities.

In the military force the art of sanitation is founded upon a knowledge of hygiene. Commanders of troops who have a clear understanding of the fundamental hygienic principles may intelligently select and apply the sanitary methods required to meet the needs of their troops under various conditions. Field sanitation employs all the sanitary methods used in civilian communities and, in addition, those special methods found necessary to preserve the health of troops living under conditions peculiar to military service. Sanitation is closely related and basic to preventive medicine. Preventive medicine as related to military forces is discussed in Chapter IV. There is necessarily some inclusion and reference to disease in the discussion of sanitation—field sanitation has a large part in prevention of disease.

Purpose. When troops take to the field they leave behind all the comforts and appliances of modern civilization, the shelter over their heads, beds to sleep in, safe drinking water from a handy faucet, cooking ranges, toilets and bath tubs, in a word all that is accepted so naturally without thought in our daily life at home. And yet these things are necessary and must be provided. (FM 8-40 and TM 8-255). Impure water cannot be used; human excreta, manure, and garbage must be disposed of in an efficient and sanitary manner; clothing infested with parasites must be sterilized; food must be preserved from flies and other insects; and bathing, laundry, and toilet facilities must be provided.

Responsibility. Who shall be the judge as to what water is safe for human consumption and advise as to its method of sterilization? Who is called upon to recommend as to sanitary requirements in the selection of a camp site? Who advises and instructs regarding the disposal of camp wastes? Who, in short, must know the right thing to do and how to do it? It is obviously not the duty of the line officer. He is skilled in warfare, and it is his duty to engage with the enemy in armed conflict. While he is responsible for the entire administration of his command he is forced to depend on his staff of trained officers for technical advice and assistance. Upon the *medical officer* then must fall the responsibility of advising as to these sanitary measures and appliances.

And yet, the average doctor, trained though he be in the practice of medicine and surgery, is wholly incapable of advising on these important matters. It is obvious, therefore, that the exigencies of military life require a type of training that is not ordinarily acquired by medical practitioners. In other words, in warfare and field service, medical men are needed who are trained in military matters and military hygiene and sanitation. The average doctor, though he be in uniform and though he be skilled in the arts of medicine and surgery, may be of little assistance to his commanding officer and to the military service if he is ignorant of these other matters. Remember that in no war in history have deaths in battle equaled the number of deaths caused by disease. When to this is added the acknowledged fact that most diseases are preventable, the importance of military hygiene, sanitation, and preventive medicine may be appreciated.

Historical Background. Camp sanitation plays no little part in the prevention of disease. During the Spanish-American War the importance of pure water, the danger from flies and other insect carriers, and the proper disposal of camp wastes were not sufficiently appreciated by all. As a consequence typhoid fever ran rampant, incapacitating thousands of men before they ever reached the battlefield. Human excrement was disposed of in pit latrines and then covered with lime. It was not, however, adequately protected from flies nor was

the food that the men ate. It was no unusual experience in those days for men to notice and to complain of particles of lime on their food that had been deposited there by flies directly from the latrines. Commanding officers and soldiers failed to appreciate the dangers of impure water, especially in the tropics, and were sometimes careless about what they drank, so that dysentery was widespread. In fairness, however, it must be said that this was not due wholly or even largely to indifference to the dangers, but rather to the difficulties encountered in campaign conditions and to a lack of knowledge of and facilities for the purification of water in the field by methods which we now have.

Responsibility of Line Officers. From time immemorial, it has been held that the commanding officer of any military organization, regardless of its strength or type, is responsible in all respects for that organization. He is, therefore, responsible for the health of the members of his command and, consequently, for the initiation and enforcement of suitable measures that will most effectively protect their health. To handle a military force in battle is much less difficult than to bring it on to the field in good condition. The maintenance of the health of his soldiers, and, consequently, the military power of his organization, is one of the highest duties of a commander.

Cooperation of Line with Medical Officers. The advice of the medical officer is invaluable in the conservation of the health of troops, and the commanding officer will lean heavily upon his surgeon in all matters pertaining to the health of his men. The commander realizes that rigid sanitation is the tool by which health is maintained. Usually, the recommendations of the experienced medical officer are accepted without question and are carried out just as fully and as promptly as possible. All the reasonable recommendations of a medical officer will be given the gravest consideration by the commander concerned.

Experienced officers have long recognized that for the preservation of the health of their troops—and thereby their effective strength—sanitary requirements are exceeded only by military necessity, and that the military necessity which must disregard sanitary requirements exists very seldom and then only when in actual contact with an enemy.

MARCHES

The Soldier's Load. When a soldier goes into the field he must carry on his own back the equipment and clothing that he requires. In the selection of the materials entering into this equipment, the weight of the load, and its distribution on the body of the soldier, the medical man plays an important advisory part. An overloaded soldier either arrives too late on the scene of the fighting, throws away excess equipment, or else arrives too exhausted to fight.

The proper load for an infantryman is one that does not exceed $\frac{1}{3}$ the body weight or about 50 pounds for the average man. The maximum load is 45 per cent of the body weight or 67 pounds for a 150 pound man. Above 45 per cent the average expenditure of energy increases three times as rapidly as the load.

The load should be so adjusted that it is as near as possible to the center of gravity of the body. The nearer it is to this point the less muscular exertion is required to maintain equilibrium. The center of gravity of the body in the erect position is 0.6 cm. in front of a line connecting the centers of the femoral heads and opposite the center of the body of the third lumbar vertebra.

There should be no constriction of the chest. Pressure on the chest not only causes an increased expenditure in an effort to breathe, but also causes the heart severe embarrassment by the force required to expel the supplemental air against the increased intrathoracic pressure.

Constriction of the abdomen restricts its expansion and thus lessens the excursion of the diaphragm. This embarrasses respiration and further prevents the abdomen from serving as an expandible reservoir of blood, throwing an added strain on the heart. All load should be borne by the shoulders and back and should fall mainly on the trapezius muscles rather than on the clavicles or acromion processes.

Marching. Marching constitutes the principle occupation of troops in campaign and is one of the heaviest causes of loss. The importance of the ability to march and thus secure

preponderance of numbers at the critical time and place for victory has always been recognized by the great strategists. And yet there is no secret in the ability to make successful marches beyond the secret of attention to detail and the observance of the rules of the game. In this the conscientious medical officer has an important part.

Preparation for a March. Troops should be trained to march by a graduated scale of work, exactly as athletes must gradually develop their endurance and skill. Medical officers should insist that a regular program be followed, commencing with exercises and drill, followed by marching without packs and short marches with light packs, gradually increasing the size of the pack and length of the march until the men are able to march 15 miles a day under full pack without exhaustion.

The success or failure of a campaign may depend on the attention to detail by medical and line officers. Except when provided with rail or motor transportation, the motive power of the soldier is in his legs and feet. No soldier can march with bad feet and no one can afford to neglect his feet. The attention to the feet begins with the selection and fitting of proper shoes, the kind and fit of socks, the proper cutting of toe nails and the care of the skin, and ends with the rigid inspection and care of the feet at the end of each day's march. Only in this way will the feet be able to withstand the gruelling punishment of long marches on rough roads under a heavy pack. In Chapter V, shoe and sock fitting is discussed and rules are given for the care of the feet. It is desired here only to emphasize their importance.

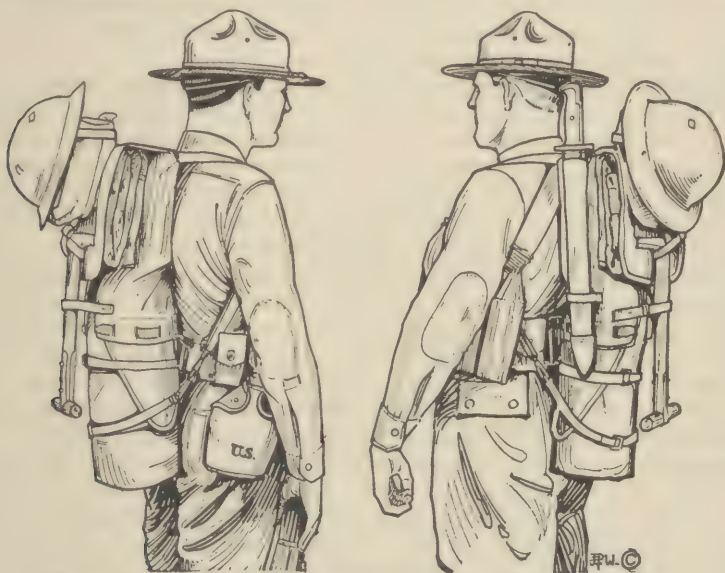


Plate 1. Full Equipment Adjusted to the Infantry Soldier.

Before starting on a march the men should be inspected as to their general state of health and the obviously ill separated out. The adjustment of the pack is carefully noted. A detailed foot and foot-wear inspection is made, and all defects are corrected before the march is begun.

Conduct of the March. Marches should be conducted during the most temperate part of the day, in the cool of the morning or the afternoon, preferably the former. Morning marches should begin about one hour after daylight, thus affording ample opportunity after arising to eat breakfast, break camp, adjust packs, police camp, and attend to the calls of nature. Breakfast should be a light one and include fuel-supplying foods such as sugar and fat.

Night marches are more trying than day marches and generally should be shorter. They should begin soon after dark and end if possible by 1:00 A.M. or 2:00 A.M. to allow the troops to sleep during the early morning hours. Tactical considerations, however, often

require the march to be so timed as to assure the arrival of the troops for assault at day-break.

It is very important that canteens be filled with potable water at the start. Frequently soldiers fail to do this and, becoming thirsty on the march, take whatever water is available from surface sources, which are usually unsafe. This is particularly true in hot tropical countries where unless water discipline is strict, soldiers are apt to drink from pools and streams, all of which are dangerously polluted.

Water carts are filled and chlorinated at the commencement of the march.

Troops should march at once after falling in. It is both tiring and injurious to morale to stand around under full pack waiting to move out.

Experience is an important guide in all these matters. March technic that would be successful in a temperate climate utterly fails in arid deserts or in tropical jungles. This is one reason why all officers are required to have a broad experience and are sent to foreign duty in tropical lands. In jungle hiking the vegetation is so dense that, unless a column is kept compactly closed up and a responsible officer is stationed at the rear who keeps in constant touch with the leader, soldiers will stray and at once become hopelessly lost. More than one command has dissolved in the dense tangles of a tropical jungle, never to be reassembled. On account of the heavy rains, the sudden incidence of darkness when the sun sets, and the necessity to pitch camp in a wet and impenetrable forest, the march is usually terminated not later than 2:00 P.M., after a very early start, and tents pitched or fern shacks constructed in the early afternoon. Troops can then get under cover and change to dry clothing from waterproof bags; otherwise the command rapidly becomes exhausted from exposure and improper camp conditions.

The *rate of march* is $2\frac{1}{4}$ to $2\frac{1}{2}$ miles per hour, including the hourly halts.

The *halts* for rest are made at regular intervals. The first halt is for 15 minutes at the end of the first 45 minutes of marching for the purpose of allowing troops to relieve themselves and to adjust packs. Thereafter there are halts of 10 minutes after each 50 minutes of marching. A halt of from 30 minutes to an hour is usually made at the "noon halt," during which a light meal may be eaten. During the halts the men should always take off their packs. If the ground is not wet they should lie down.

The *distance* averaged by foot troops per day is 12 miles for large commands and 15 for small ones. Anything more than this is called a "forced march." Greater distances are covered not by increasing the rate of march but by extending the time of the march.

Physical inspection of the troops should be made by company officers and surgeons during the march to note men who give evidence of fatigue. If these men are cared for early they may be prevented from becoming march casualties and saved to the command. Special attention should be given to the complaints about foot affections.

The men march in a column of twos, threes or fours at route step. Advantage should be taken of paths and shade along the route. Hard pavements should be avoided when dry dirt roads are available and foot troops should, when practicable, be marched on separate roads from mounted troops, artillery, and transport. Men should be allowed to unbutton their collars and shirts. In summer the sleeves may be rolled up. Such simple precautions often save men from heat exhaustion. The order of march in the platoon should be alternated each day, giving the short men as well as the tall men an opportunity to lead the column.

Troops should be halted well clear of their camp to come up slowly and be somewhat cooled off and rested when arriving in camp.

Water Discipline. Water discipline is essential. Raw recruits are inclined to empty canteens soon after the start of a march and then drink surface water that may be highly polluted. Slow sipping economizes water and quenches thirst better than large gulps. Sucking a small pebble or chewing gum is valuable because the mouth is kept closed and the flow of saliva is increased. The desire for water is decreased.

The normal needs of water average about one quart of water at the end of $7\frac{1}{2}$ miles marched under average conditions. This may be increased or decreased depending upon any factor that increases or decreases body heat.

The amount of water evaporated during a given march with the effects if not replaced are as follows:

TABLE, WATER EVAPORATION ON THE MARCH

Miles Marched	Quarts Evaporated	Effects if loss is not replaced
7½	1	Thirst
15	2	Slight inefficiency
22	3	Marked inefficiency
30	4	Danger

Water supply on the march is maintained in several ways. The normal routine of providing potable water consists of:

Overnight sterilization. Fill canteens and carts so that by morning the water is cold, or chlorinated water is free from taste. If water is sterilized by boiling, it is better made into weak tea.

At start in morning. All canteens and carts should be full of cool, sterile water.

At half-way halt. Canteens should be refilled from water carts, strict care being taken to avoid waste. Water carts should be refilled at once, if possible, and contents chlorinated.

At end of march. Advance arrangements should be made as to the water supply by the following officers:

Medical officers are responsible for the purity of water from main sources.

Engineers are responsible for the quantity and delivery of water.

Unit commanders are responsible for water guards and distribution of water.

Water supplies are rigidly protected, a responsibility that is shared by all officers. Streams are marked showing filling point for water for cooking and drinking, next down stream a place for watering animals, and, below this, places for bathing and for washing clothing, respectively. A patrol is put on the stream to enforce these regulations. Guards are placed over important springs and wells.

Prior to *arrival at camp* medical officers with some of their personnel should go forward with the advance party to supervise the sanitary arrangements which should be prepared for the troops on their arrival, such as latrines, urinals, water supply, kitchen waste disposal, infirmary, and similar medical matters. On arrival, units are assigned their company areas, packs unslung, tents pitched, orders read, inspection of feet made, and sick call held. Men are allowed to rest. When possible it is well to avoid making camp after dark. Troops should never be kept standing in ranks after arrival at the camp site but should be immediately sent to the areas assigned them. A substantial hot meal should be served promptly at the end of the march. Commanders must personally see that their men wash their feet as soon as possible after reaching camp and that their feet are treated as required. Details of the care of the feet are related in Chapter V. Material requirements necessary for change of socks and shoes must be provided the troops before the march.

Duties of the Medical Officer. The duties of a medical officer of a unit on the march are best accomplished if he will keep towards the rear where he can gauge the men's fitness, observe the effects of the march on both the strong and the weak, and treat soldiers who have been referred to him by the unit commander. Sick men will be evacuated or placed at collecting points previously coordinated with the evacuation system.

Toward the end of the march he should request to have the necessary sanitary personnel join the advance guard to supervise the water purification and other sanitary arrangements for the camp site before the main body arrives.

During the longer halts the medical officer can make closer inspection of the individual men who have complaints, and by inquiry of several members of the unit can estimate the general physical condition of the force.

The medical officer should keep himself acquainted with the policies and plans of the unit commander so that the medical and sanitary arrangements can be outlined and established to conform to and satisfy this plan. The ambitious medical officer who shows keen interest in the welfare of the troops will soon gain their confidence and do much to stimulate and maintain morale.

CAMPS AND CAMP SITES

The careful selection of a camp site is most important. The medical officer is frequently asked to advise as to the suitability of a camp, and it is incumbent on him to know how to survey sites available for a camp and advise intelligently on its selection and preparation.

Strategical and tactical requirements usually dictate the choice of camp sites, and under such circumstances sanitary considerations alone will not be the governing factor. Within these limitations, however, the most favorable site from a sanitary point of view should be selected.

Kinds of Camps. Camps are of various kinds. Temporary camps are those that are used from one night to six months. They vary from the bivouac which is a one-night camp on the march or in active service confronting the enemy and in which the shelter or "pup" tent is used, to more durable camps with heavy tentage. Permanent or semi-permanent camps are used for a period longer than six months. They may consist of mobilization or training camps where troops are assembled and trained, embarkation or debarkation camps near sea ports for the embarkation or reception of troops, and segregation camps for the quarantining of troops for contagious diseases, including venereal diseases.

Sanitary Survey of Proposed Camp Sites. A sanitary survey should be made of the proposed sites bearing in mind the following considerations:

The character of the site and the surrounding territory, the natural drainage, and the nature of the subsoil should be noted.

The methods of waste disposal should be studied.

The water supply should be investigated as to its adequacy and potability.

The types of habitation required should be borne in mind—usually this will be tentage supplied by the troops themselves.

The presence of insects and the character of the vegetation are important. Have an eye for insect vectors of disease and poisonous plants dangerous to man and animals.

The presence of communicable diseases in the surrounding territory may be of great importance and tend to forbid the establishment of a camp in that vicinity.

A Suitable Camp Site. Following are the requirements of a suitable camp site:

The available space should be large enough to accommodate the command without crowding, allowing ground for erection of all necessary tentage and depots with an area for exercise and training.

Camp on a sloping ground is preferable to that on flat ground. This gives positive drainage and insures against stagnant surface water. It is not necessary to place it on the top of a hill.

Firm, porous soil covered with grass is the most desirable. This insures against excessive mud in wet weather, and dust in dry weather. Ground water is usually lower in such soil, affording better opportunities for disposal of waste water by seepage. There is also less apt to be surface water in such soil.

There should be no marshes, stagnant pools, or ponds in the neighborhood which might be the breeding sites for mosquitoes.

Water supply should be sufficient in quantity and of such quality as will permit purification with the available means.

Wood, grass, and forage should be easily obtainable.

The camp site should be accessible from the main routes of transportation but not necessarily astride of roads on account of the excessive dust and disturbance.

In cold countries ground sloping to the south, with woods to shut off the north winds, should be chosen.

In hot countries, the ground should be high, free from underbrush, and shaded with trees. Prevailing winds from one direction are desirable. Such winds aid in keeping insects away, especially flies, from the latrines and picket lines, and afford an opportunity of putting such establishments to the leeward instead of haphazard. Violent winds are undesirable on account of the cold in the winter and the dust in the summer. Shelter from such winds is offered by leeward slopes and by woods.

Woods frequently are chosen for camp sites since they offer concealment from the

enemy. Open woods without underbrush are ideal, but very dense forest is poorly sunned and is usually very damp and poorly ventilated.

Undesirable Camp Sites. The sites of old camps and the vicinities of cemeteries should be avoided. Marshy ground, ground near the foothills of a range with damp subsoil, plowed ground, depressions, closed ravines, dry beds of streams, thick forests, and insect-infested areas are all undesirable.

The presence of *disease-bearing insects* may be of utmost importance. The very tenability of a situation may rest on this factor alone, and it may become an important factor in the defense of a region. For instance, in the tropics, if a hostile and invading force could be held for some days in a heavily malarious region while the defending forces occupied higher, healthy ground, the entire campaign might be decided by this factor alone. Where disease-carrying insects prevail in great numbers all war plans have to take serious account of such a condition. Some of the most difficult problems that face the defending forces in the Philippines have to do with the control of mosquitoes in dangerously malarious but strategically important areas.

Interior Arrangement of Camp. The interior arrangement of the camp must conform to the site chosen. For most purposes the camp area will usually be approximately square. The kitchens should be on the windward flank (if there is one), the latrines being on the opposite flank with the company tents between.

All tents should be individually ditched, especially if they are not provided with floors. Side walls should be rolled on all good days to allow sunlight and ventilation of the tent. Bedding should be aired and sunned frequently and systematically. In cold weather tents are heated with the conical Sibley stoves set in sand boxes.

Breaking Camp. Upon breaking camp it should be well policed. This is the responsibility of the commanding officer, but medical officers hold an advisory responsibility. All latrines should be well filled in and marked with a sign post to warn future campers, refuse should be disposed of, and in general the ground left as nearly as possible in the condition in which it was found or better. There are many instances where subordinate units have been sent back to police a camp site which was left in an unsanitary condition.

WATER SUPPLY AND FIELD PURIFICATION

Importance of Pure Water. The importance of pure water cannot be over-emphasized. Until the method of spread of intestinal diseases was understood and the part that water played in the conveyance of these diseases recognized, they were the largest cause of morbidity and sickness in the armies of the world.

Potable (Safe) Water. Pure water is, of course, the quality of water desired but seldom found. Even though a natural source of pure water is available in a given area when a body of troops arrives to occupy it, the likelihood of such a water remaining pure is very remote, as water becomes polluted very easily. Contrary to popular impression, it is not possible to determine, by simply looking at it, whether or not a particular water supply is safe for drinking in its natural state. The cool, sparkling water from the clearest spring may be laden with disease producing germs. On the other hand the water from a muddy or discolored stream may be suitable to drink in its raw state. The only safe method of dealing with water from an unknown source is to assume it to be dangerous until it is proven otherwise. Even water from a community's public water supply system cannot be taken for granted as being a safe water just because it happens to be from a public supply system. The safety of such a water can be quickly and easily ascertained, and such action should be taken before it is pronounced safe for troops.

Sources of Water. The common sources of water are rivers and streams, lakes, wells, springs, tube borings, and distillation.

Water from rivers and streams cannot be considered safe.

Lakes, if large, are usually clean in the center. The action of the sun and of oxygen purifies the water far from the shore. Shore water is never safe.

Spring water is of two kinds, namely land and main springs. Land springs are formed by water that percolates through the ground and appears at lower levels. It may be heavily contaminated. Main springs are derived from underground reservoirs lying between two impermeable strata. Such water has usually been filtered through a con-

siderable depth of soil and is usually, but not necessarily, free of disease-producing germs. All such water of course contains soil bacteria and is not sterile, though it may be potable and safe for human consumption.

Well water is subsurface water and not necessarily safe just because it is not on the surface. Shallow wells may drain the surface almost directly and deeper wells in the vicinity of privies and barnyards may, in porous soil, be heavily contaminated. No well water should be accepted as safe until it has been proven so bacteriologically. To be safe, wells should penetrate through an impermeable stratum, be lined so as to exclude surface drainage, covered to prevent surface contamination, and equipped with pumps, etc. so that nothing is introduced, such as buckets, from the outside.



Plate 2. The Clear, Sparkling Water of a Spring May be Polluted by Waste from a Privy.

Artesian water obtained by tube borings is usually safe. Such water comes from underground supplies, formed by water draining from hills underneath impermeable strata of soil. It is best obtained in valleys and at the lowest points of plains.

Distilled water is bacteriologically pure but is not obtainable in sufficient quantities.

Responsibility for Water Supplies. In the army, the Quartermaster Corps is responsible for the quantity and quality of all water supplies in time of peace, and for the Zone of the Interior in time of war. The Corps of Engineers is responsible for the quantity and quality of the water supplies for troops in the Theater of Operations to divisions and higher mobile units. Organizations below the division generally have to provide their own water supply, usually under the general supervision of the Corps of Engineers. The Medical Department is responsible for determining the potability of, and advising as to the sanitary suitability of, all water supplies for military personnel at all times and places. The unit commander is responsible for the water discipline of his organization and for the execution of standing orders pertaining to the purification of water by and within his own organization.

Water Requirements. All living things require water. Experience has shown that the minimum amount of water that must be provided for troops under ordinary conditions of march or in bivouac is 1 gallon per man per day, 1½ quarts for drinking and 2½ quarts for cooking and drinking with meals, either as water, as coffee, or other beverage. However, climatic conditions and the effort of march may alter this minimum.

Let us suppose that the commanding officer of a body of troops desires to move camp to another location. He is anxious to know how much water will be required per man per day during the march and in the new location. The medical officer is asked to estimate these requirements and to advise on the plan. What then are the water requirements in the various situations, in permanent camps, in semipermanent camps, on the march, or in bivouac? The following will serve as a guide in this estimation.

Permanent camps: One should estimate a per capita consumption of 50 gallons per day where there is a water-borne sewer system and where there are the usual lawns and other features requiring water.

Temporary camps: One should estimate 5 gallons per person per day and 10 gallons per animal. This amount should not be greatly exceeded since waste water must be disposed of by improvised methods and an excess will collect as unsanitary surface water.

Bivouac and march: Two gallons per capita are necessary, except under unusual conditions when 1 gallon is the absolute minimum as indicated above. This is based on 1 gallon for cooking and drinking purposes and 1 gallon for washing. The animals will each require 4 to 10 gallons depending on whether the weather is cold or hot.

In combat: The amount necessary to retain efficiency should not be less than the minimum of $1\frac{1}{2}$ gallons per capita per day. In extreme conditions animals can be limited to 5 gallons per animal per day.

Determination of Water Yield. In estimating the requirements of the command it is also important to calculate the yields that may be expected from the sources of water available. This estimation of a small stream should not be made immediately after a rainstorm, and if circumstances do not permit any other time consideration must be given thereto.

This estimation can usually be done only by actual measurement. The water content in cubic feet of a well, pool, or other container of standing water is determined by multiplying its surface area by its average depth, determined by the best measurements possible. Having found the contents in cubic feet, multiply by 7.48 to determine the number of gallons. The daily yield is usually also of importance. To determine the yield of a well or spring, lower the surface rapidly by pumping; measure or calculate the amount pumped out, and note the time required for the well to regain its normal level. Thus if the surface of a circular well 4 feet in diameter be lowered 2 feet by pumping, the amount pumped out is $\pi \times 2^2 \times 2$ or $3.1416 \times 4 \times 2 = 25.13$ cu. ft. = 188 gallons. If the well regains its level in one hour its daily yield is probably at least $188 \times 24 = 4512$ gallons, and may be more.

The volume of flow of a small stream is determined as follows: Select a fairly long reach in which the channel is straight, uniform in size (or nearly so), and free from eddies. Determine the cross section area of the water at the center of the reach selected, by measuring the width, and taking several soundings across the stream. Measure off any convenient length, as 30 or 50 feet, on the bank and mark the ends. Now drop a chip of wood in the center of the channel upstream and note the number of seconds it requires to travel the measured distance. Divide the distance in feet by the time in seconds, giving the surface velocity in feet per second. The mean velocity is about $\frac{4}{5}$ of the surface velocity. Multiply the cross section area (in square feet) by the mean velocity (in feet per second) and the result is the flow of the stream in cubic feet per second, which may be taken as constant so long as its level remains the same.

In very small streams it may be necessary to build a dam or insert a receptacle (such as a cask) in the bottom to conserve the flow. The flow from a weir in the dam may be caught and measured, or the time required to fill a cask in the bottom noted. A standard cask holds about 55 gallons.

Protection of Water Supply Sources. Every source of water supply, civilian or military, should be carefully guarded against pollution. The principal and most dangerous pollution is human and animal excrement or sewage; these wastes are often intentionally placed in water to dispose of them or are washed in from deposits of excrement on or near the surface of the ground. During droughts, surface and ground waters are more likely to be polluted than under average conditions. During floods high water reaches deposits of excrement and washes them into the watercourses. Such deposits would not ordinarily be dangerous.

Water supply sources for military forces can be, and usually are, carefully guarded so as to minimize the possibility of local pollution. Latrines are placed so that surface or underground drainage from them cannot reach the water source. Great care must be taken that the watershed is not contaminated by careless individuals. When streams are used as a source of water, points along the stream are designated at which water for various purposes may be drawn. Beginning upstream the following points are designated: water for drinking and cooking, water for animals, and water for washing and bathing (Plate 3). It is often necessary to place a "water guard" to enforce compliance with such instructions.

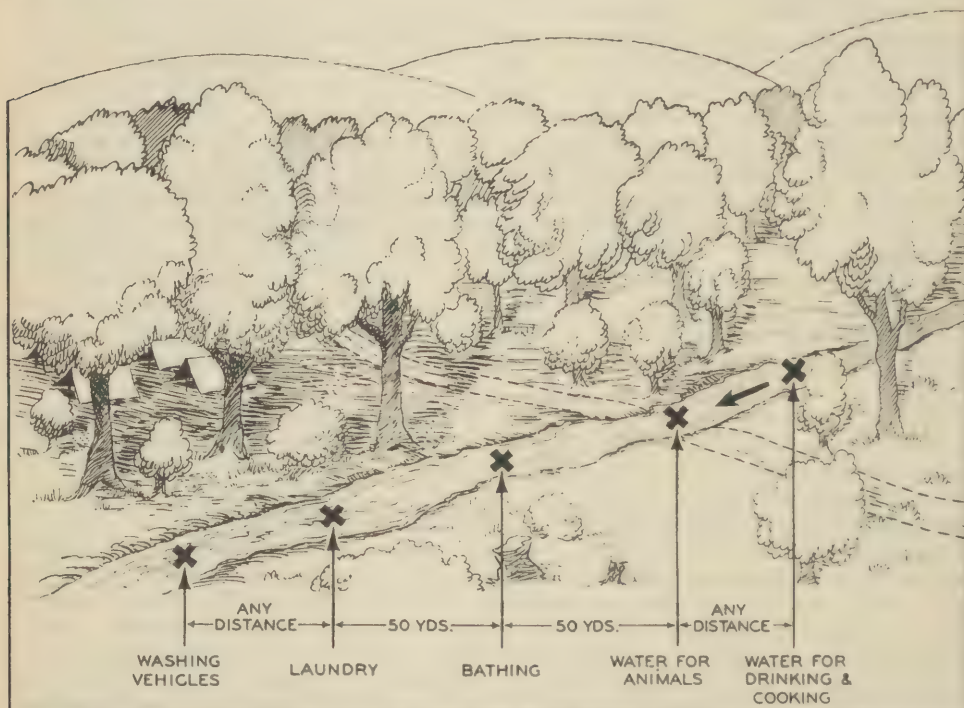


Plate 3. Location of Water Sources (Stream).

Purification of Water. The average person surrounded by the benefits furnished by modern public health service gives little thought to the machinery behind it and the efforts that are put out to conserve the public health. The medical officer quickly realizes this when upon him is suddenly thrown the responsibility for the health of large bodies of troops. In time of war and of public peril the civilian practitioner or the medical officer may be the ultimate factor in bringing about a successful or unsuccessful outcome, particularly as regards the Army. He becomes a small public health service and is expected to function for the good of his community in preserving its health. Among his most important duties is the overseeing of the water supply and advising as to its purification. Some practical method must be found to purify water that is easy to carry out, that can be used with small numbers of troops as well as large, that can be carried on in the field and so be available at all times, and that will be efficient and dependable.

Distillation, while it is a certain method of obtaining pure water, is usually out of the question.

Boiling sterilizes water and can be used on a small scale but is impracticable on a large scale. A company of 250 men requires three barrels of water daily for drinking purposes alone. The amount of labor and time required to boil so much water daily is almost prohibitive, so that this method can never be of wide application, especially with moving commands.

Therefore some other method must be sought. The most reasonable solution is to devise some method of purifying water *chemically*, and this is exactly what has been done. An Army medical officer, Major Darnall, discovered the principle of chlorination of water and in 1910 originated the liquid chlorine method of purification. Utilizing this knowledge, a small field chlorinating outfit has been devised and is used by the Army. It is one of the most important contributions to military sanitation that has ever been made. (See Plate 4). This simple and yet important outfit is known as the water-sterilizing bag. Before using chlorination, the water should be clarified, if that is necessary, as related in the following paragraph.

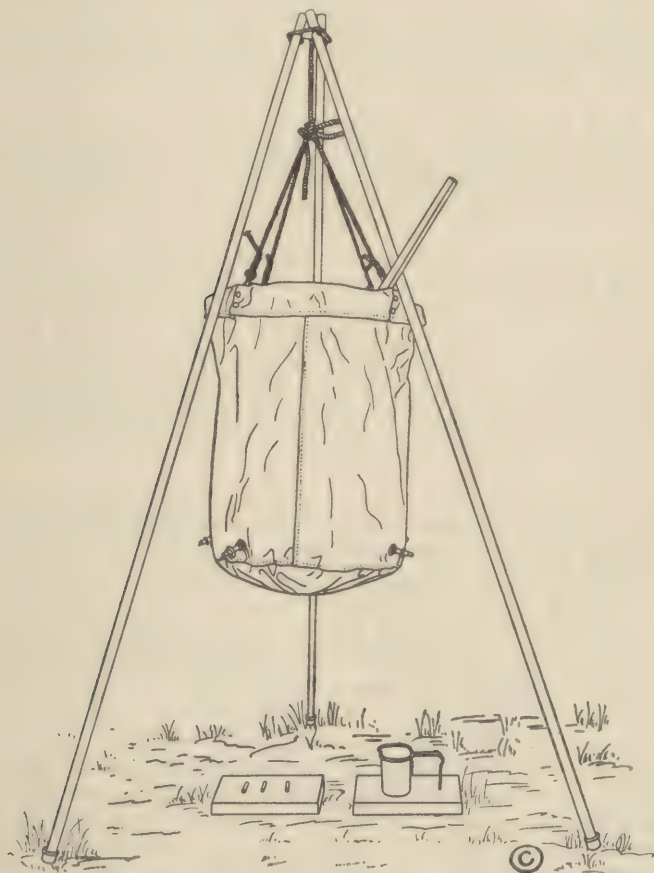


Plate 4. Water Sterilizing Bag, with Tripod.

Before water is rendered free of bacteria chemically it should be *clarified* if it is muddy or contains a large quantity of organic material. This may be accomplished by constructing small settling beds or by damming streams. A settling bed may be made by digging out a pool and lining it with a woven brush cylinder, or gabion, a barrel or box with both ends removed, or with stones. The space between the lining and the earth is filled with puddled clay. Water is allowed to settle in such a bed until the major portion of the solids have sunk to the bottom.

Water may also be clarified by a rude sort of filtration if the soil on the banks of the stream is pervious. In this case pits are dug alongside the stream and the water is allowed to enter these by seepage. Or water may be strained through gauze or blankets to clear it. While these methods remove the solids they in no way free the water from its bacterial content.

Chlorination is one of the most effective measures of purifying water from pathogenic organisms. It is an accepted fact that one part of chlorine per million parts of water will kill most, if not all, of the bacteria contained in the water providing sufficient time is allowed for the action to take place. In practice, calcium hypochlorite or chloride of lime is used, preferably the Grade A calcium hypochlorite which contains about 70 per cent available chlorine. The amount used should be such that the residual chlorine in the treated water will be less than 0.5 part per million. Four-tenths part per million produces a marked taste, but more than that amount of residual chlorine in the presence of organic matter will produce a definite objectionable taste. The use of sodium thiosulphate is not recommended to neutralize the excess chlorine and to remove tastes and odors, unless strictly supervised by a competent officer acquainted with the procedure. It is best to use a small amount of Grade A calcium hypochlorite initially, testing it with orthotolidine immediately after the addition of hypochlorite solution until sufficient residual chlorine remains.

Purification of Water in the Field. An unknown water can be rendered potable in the field by a very simple procedure, that of adding a small amount of chlorine to the water. The efficacy of this procedure (chlorination) has long been recognized in the military service and is provided for by a simple apparatus that is very easily transported and operated.

The *equipment* consists of a canvas water bag, and a chlorine compound (calcium hypochlorite) put up in a small sealed glass tube. The bag and the chemical are obtained from the Quartermaster Corps, not from the Medical Department. The *canvas bag* weighs about 7½ pounds, holds about 36 gallons of water (20 inches in diameter and 28 inches in length), and is provided with a canvas cover. It is solely a stationary receptacle in which water can be held while it is being sterilized and from which it can be distributed through faucets without dipping, these faucets being arranged around the bottom of the bag. This apparatus is issued to troops at the rate of one to each 100 men or fraction thereof.

The *procedure* is as follows:

- (1) Suspend the bag on a tripod. Fill it with water to the mark four inches from the top, straining the water through cheesecloth.
- (2) Draw a small quantity of water through one of the faucets into a canteen cup.
- (3) Break a tube of calcium hypochlorite into the canteen cup, stir with a clean stick, then fill the cup two-thirds full of water.
- (4) Empty this solution into the water bag and stir thoroughly with a clean stick which is long enough to reach to the bottom of the bag.
- (5) Draw at least one-half canteen cup of water from each of the faucets and pour it back into the water bag. This serves to sterilize the faucets.
- (6) Wait 10 minutes, then wash out one of the faucets by allowing a small amount of water to run through onto the ground. Fill a clean canteen cup two-thirds full of water from the same faucet. Add one cc. (fifteen drops) of orthotolidine testing solution to the water in the cup. Wait five minutes and note the color produced. Below is a guide for reading the color reaction between the free chlorine and orthotolidine:

No color. Insufficient chlorination. Add more calcium hypochlorite.

Canary yellow. Insufficient chlorination. Add more calcium hypochlorite.

Deep yellow. Satisfactory chlorination. This represents about one part per million (ppm) of chlorine.

Orange red. Overchlorinated. Add more water and re-test.

Bluish green. Alkaline or hard water. Add a few more drops of orthotolidine to get a correct color reading.

- (7) At the end of thirty minutes wash out the faucets for the final time, running five cups of water through each and returning the water to the bag. The water should now be perfectly safe even if it was heavily contaminated.

Chlorinating Water for Small Detachments. Frequently small detachments are separated from the main body and from the supply of chlorinated water at the company messes. Their drinking water carried in canteens may be chlorinated as follows: Mix the con-

tents of one tube of hypochlorite in a quart of water and preserve in a *glass* bottle. Do not use a metal container as the concentrated hypochlorite solution has a chemical action on the metal. Add one teaspoonful, or the amount contained in a canteen cap, of this solution to a canteen of water and wait thirty minutes before drinking. This is known as the *canteen method*.

Water Cart Method. Chlorination may be done directly in water carts, stirring in calcium hypochlorite at the rate of about one tube to each 36 gallons of water. The exact amount needed can be determined by the orthotolidine test. These carts must be thoroughly cleaned at frequent intervals.

Use of Iodine for Purification of Water. Water may also be sterilized by iodine. Ten c. c. of tincture of iodine (7 per cent) added to a water-sterilizing bag full of water, will effectively purify even raw river water in thirty minutes. For individual use two or three drops of the tincture may be added to a canteen of water and allowed to stand thirty minutes. These methods have been subjected to laboratory tests and have been found to be reliable.

There are two possible objections to the iodine method. First there is no reliable method for titrating the iodine in order to test the sufficiency of the amount added, and second it is somewhat more expensive than hypochlorite.

There are three sources of iodine available to the medical officer: (1) the regular tincture; (2) "iodine swabs" or glass ampules containing $1\frac{1}{2}$ c. c. of 3 per cent iodine; and (3) iodine-potassium iodide in dry form in sealed tubes for making 50 c. c. of 2 per cent solution.

DISPOSAL OF WASTES

The disposal of waste products in the field, in camp, or in cantonment is the most important detail in field sanitation. Life in camp brings men in close contact with the soil under conditions where the usual sanitary devices of civilization are lacking, and unless great care is observed they will soon thoroughly contaminate the surroundings and disease will quickly spread. Field sanitary devices must be supplied to replace those of established communities, and various kinds of wastes must be disposed of in such a manner that pathogenic bacteria are eliminated. Waste must be changed so that it no

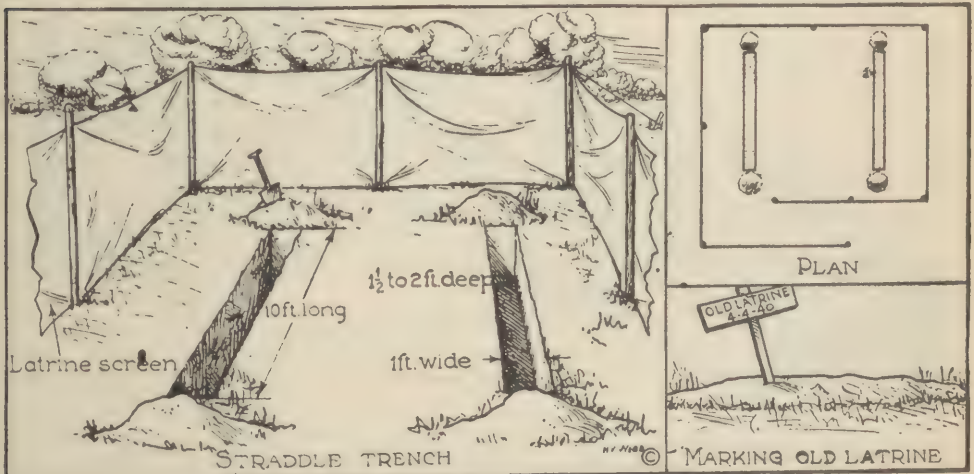


Plate 5. Straddle Trench Latrine.

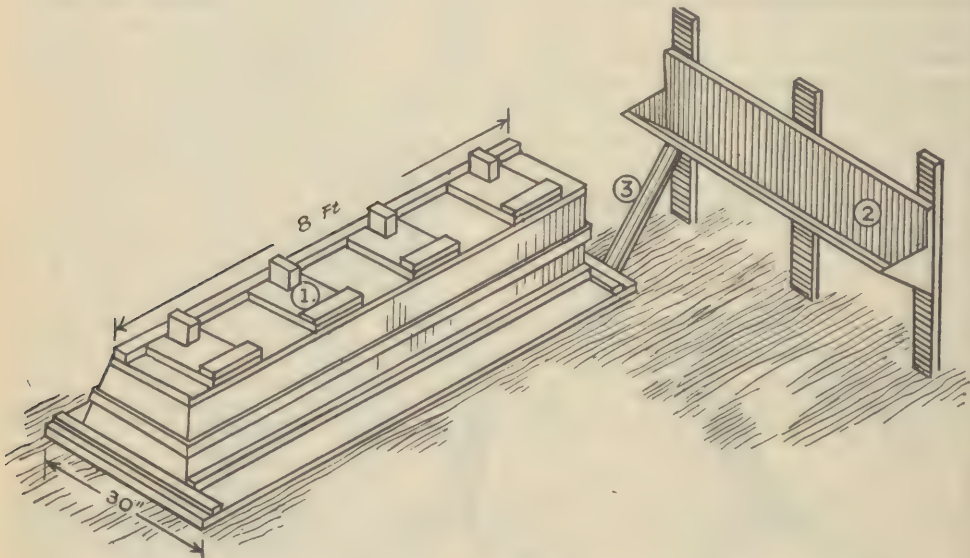
longer promotes the breeding of flies and other disease-carrying pests, and nuisances must be prevented.

The wastes to be disposed of are of two classes: solids consisting of human feces, kitchen garbage, stable refuse, general camp refuse, and carcasses; and liquids consisting of urine, kitchen sullage, and ablution sullage. They may also be classified as human wastes, kitchen wastes, animal wastes, and rubbish.

Excreta. On the *march* and in temporary camps there is no other method of disposing of human excrement except in the earth. On the march soldiers should be instructed to dig a small pit into which they should void their excrement after which it should be covered with earth. It is not only unsanitary but creates a nuisance if this precaution is not observed. In temporary camps disposal of human excrement is done by means of shallow trenches (straddle trenches) or in pits of various depths. Since nitrifying bacteria are not found normally in the soil at depths greater than 18 to 24 inches the action of these bacteria does not take place on the fecal material in the trenches. For this reason organic matter derived from the intestinal tract decomposes very slowly requiring several months to a year to break down into stable compounds. This is one reason why old camp sites are not desirable.

At *temporary camps, bivouacs*, and on *long halts*, the method of disposal of fecal material is by the straddle trench. This is a trench about one foot wide, 18 to 24 inches deep, and long enough to provide for 8 to 10 per cent of the command at one time, allowing two feet per man (Plate 5). Instead of one long trench a number of parallel trenches or individual straddle trenches (2 ft. in length) may be constructed. The whole should be enclosed in a canvas screen so as to insure privacy. A latrine guard is usually designated to enforce cleanliness. Men are required to cover their excrement with a shovelful of soil. If crude oil is available the trench should be sprayed daily with this oil. When the trench is filled to within one foot of the top it should be back-filled with earth, mounded up to one foot above the ground surface, and marked by a suitable sign.

All latrines should be constructed to the leeward of camp (if there is any prevailing wind) and 75 feet from the nearest tent or other quarters. They should be on high ground or so ditched that storm water cannot flood the area and the ditches and so spread the excrement over the surface.



(1)—Standard latrine box. (2)—Trough urinal. (3)—Pipe leading from urine trough into latrine pit.

Plate 6. Pit Latrine for Temporary and Semi-Permanent Camps.

Flies have ready access to such latrines and wherever possible they should be replaced by the pit type of latrine with fly-proof covers.

All latrines should be marked by suitable lanterns at night so that men can find them easily.

The Pit Latrine for Camps of More than One Week. For camps of over one week duration *pit latrines* should be constructed. These should be two feet wide, from four

to ten feet deep, and eight feet long. The depth will depend on the length of time that the latrine is to be used, the depth of the ground water, the character of the soil, and the presence or absence of rock. If the level of the ground water is high it is useless to make a deep pit as water will seep in and interfere with the drainage and sanitary care of the pit. In the same way a stratum of impervious clay prevents soakage of urine and the higher the clay stratum the shallower must be the pit. Rock will prevent deepening the pit unless explosive is used, which is seldom worth while.

In average soil a pit four feet in depth should be sufficient for two weeks. For a longer period a foot in depth should be added for each additional week. For four weeks a pit six feet deep is required and for six weeks a pit of eight feet in depth.

Like the straddle trenches, these pit latrines must be protected from surface water by the construction of a drainage ditch around the outside, and they should be provided with canvas latrine screens for privacy.

If in very soft ground the pit must be protected by sand bag revetments and made correspondingly larger. All of these pits must be *fly proof* in so far as is possible. Flies lay their eggs in the fecal material, where they hatch into larvae. When these larvae are ready to pupate they migrate to a dry place. They are able to migrate at least four feet through loose loamy earth, and the adult fly can again penetrate a distance of one foot, a total of five feet for the larva and the adult fly. In order to prevent these young adults emerging to the surface the area around the latrine must be made impervious to them. This is done by excavating an area four feet wide all around the pit to a depth of six inches. The floor of this excavation is then covered with burlap that is soaked in crude oil and the hole again covered with the soil. The burlap should hang over the edge of the pit to a depth of eighteen inches. If no burlap is available then a three inch layer of soil should be tamped down with oil and this again overlaid with another three inches of packed earth that is well oiled.

The latrine box is provided by the quartermaster. (See Plate 6). It consists of a box eight feet long, provided with four seats, all having covers. The covers are so constructed that they automatically close when they are not held open. This is accomplished by placing a block near the hinge of the seat cover which prevents the cover from being raised to or beyond a vertical position. They thus close automatically from their own weight when the user leaves the seat.

The edge of the pit should be curved so that it will fit close to the box, so that it will not cave in, and so that the passage of flies is prevented. The front (inside) of the box should be guarded with a strip of sheet metal to divert urine into the pit, and the back should be sloped to prevent fouling with excreta.

The bottom of the pit, sides, and interior of the box should be sprayed daily with crude oil. This kills the larvae of flies, acts as a deterrent to the adults, and serves as a deodorant.

When the pit is filled to within two feet of the surface it should be abandoned and covered with earth to a height of two feet above the ground surface. If the locality is to be occupied by troops in the next few months the spot should be marked as the site of an old latrine.

Pit latrines should be at least seventy-five feet from the nearest tentage and should be marked with a lantern at night, guarded by a latrine police, and the seats should be washed with 2 per cent cresol solution daily. In rainy weather some sort of shelter against the weather must be devised.

Pail latrines may be employed but this requires much more equipment and more efficient policing. They are frequently used in caring for the excreta of sick who cannot be evacuated from camp.

Disposal of Urine. For one night bivouacs, the straddle trenches may be used for disposal of urine as well as feces. But if the command is to remain any length of time urine troughs which drain into soakage pits should be constructed.

Urine troughs may be made of wood or of galvanized iron. If the trough is made of wood it should be lined with tar paper so that the wood will not become soaked with urine. Troughs consist of an upright back (splash board) against which the urine is voided and a gutter to collect and drain the urine. (Plate 7.) At its low end this gutter

should drain into the latrine pit, or special soakage pits should be constructed if the camp is to be occupied over one week. All troughs should be washed down daily with two per cent cresol solution to control odor and prevent the deposition of urates which soon become malodorous.

The *soakage pit* is about four feet square and four feet deep, filled with broken stone or coarse gravel from one to four inches in diameter. If rock or gravel is not available the pit may be filled with flattened tin cans, broken bottles, or pieces of concrete. (Plate 8.)

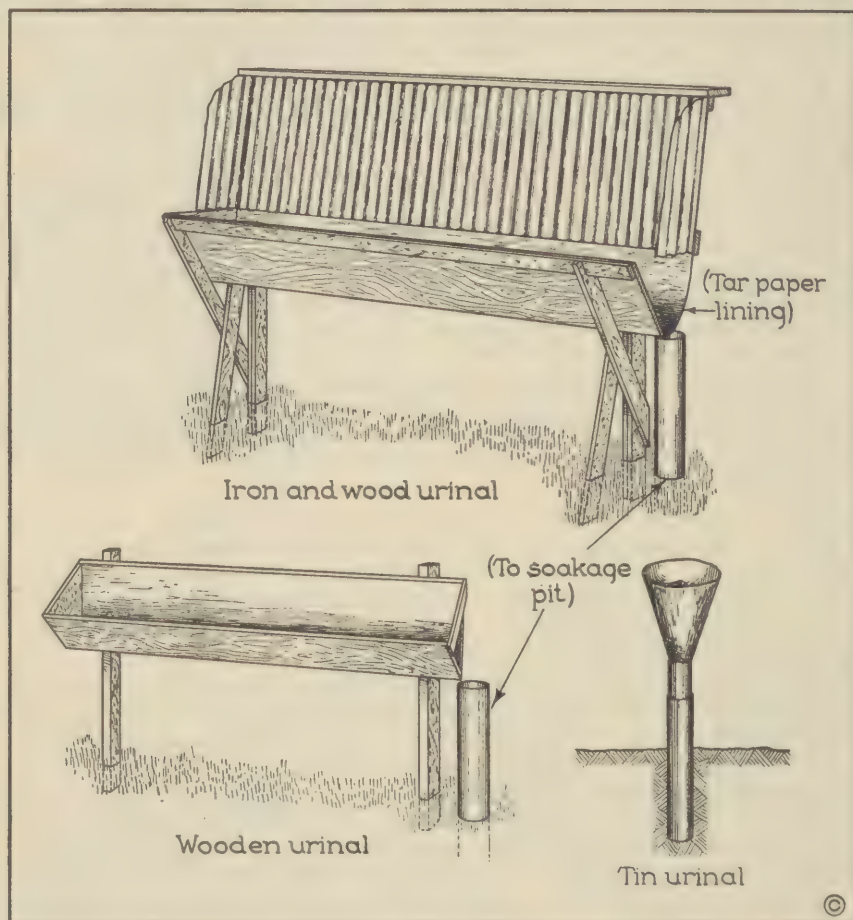


Plate 7. Urine Troughs.

Soakage pits should be ventilated in order to aid oxidation and thereby prevent odors. This is done by means of wooden ventilating shafts (4 to 6 inch boards nailed together to form a square shaft) that are placed in the pits on two sides, extending from about a foot above the surface to within six inches of the bottom. The top of the shaft should be screened against the admission of flies and refuse. Wooden shafts should have several holes bored through the side that faces the interior of the pit to facilitate the circulation of air. In place of wood, tile shafts or stove pipe may be used. For best ventilation the top of the pit should consist of fine crushed stone or gravel, rather than earth that becomes packed.

In the four corners of the soakage pit *pipe urinals* are placed. They consist of iron pipes with two to three inch mouths (funnels) inserted at an angle of about thirty degrees from the vertical and extending about eight inches below the surface and thirty inches

above. The mouth should consist of a tar paper funnel containing grass or straw. In the event that space is limited, as many as eight pipe urinals may be placed in each pit.

Soakage pits serve not only to promote absorption of the urine but also help to oxidize the organic matter as it passes over the stones in contact with the air. The efficiency of the pit depends on the character of the soil and the depth of the ground water. In good absorbent soil a pit should last indefinitely, one pit serving 100 men.

Soakage pits may be inclosed within the same canvas screen as the pit latrine, but in the event the trough urinals are used the pit may be placed outside the screen while the trough is inside. All pits should be placed so far away from camp as not to constitute a nuisance and not to contaminate the camp water supply.

In the care of the pits the ventilating shafts should be kept clean and functioning, and the grass, straw, and tar paper funnels should be frequently changed and the old ones burned. Oil should not be used in the pits as it clogs the soil and interferes with the absorption of the urine.

When pits are abandoned the funnels and drains are removed and the top of the pit is covered with a shallow layer of soil.

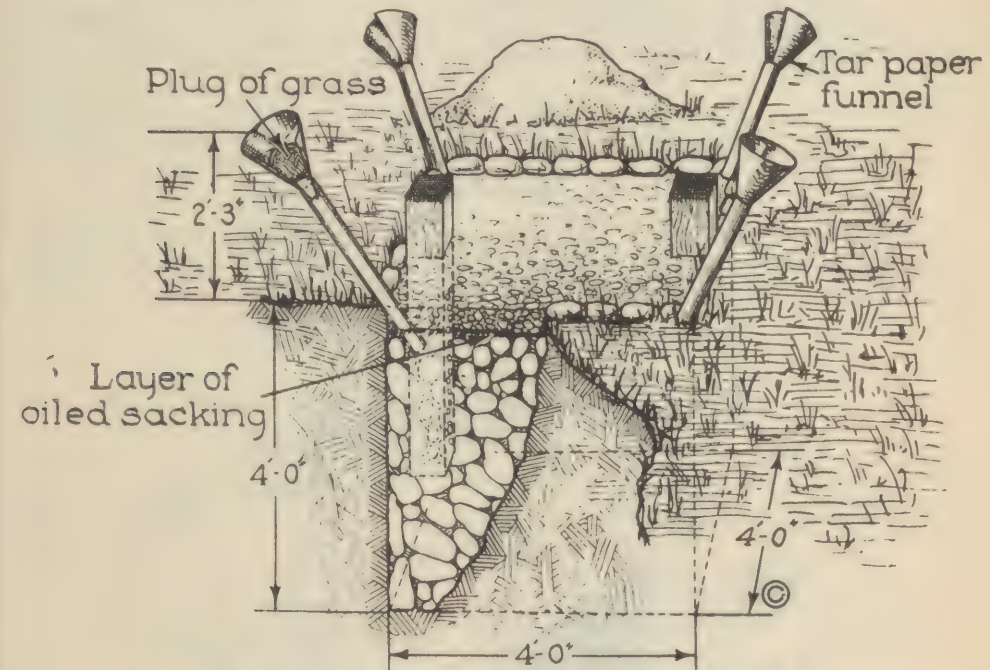


Plate 8. Urine Soakage Pit.

At night urine cans are placed in the company streets and marked by lanterns. In the morning these are emptied into the urine pits and burned out with oil and hay. Urinating upon the ground should be strictly forbidden.

Manure. Horse manure affords a choice place for the breeding of flies and therefore presents a problem for the sanitarian and the medical officer. It may be disposed of in a number of ways: by composting, by drying, by incineration, by removal by contract or used as fertilizer. Picket lines should be thoroughly swept each morning and the manure removed for disposal.

Disposal by composting. The success of composting rests upon the fact that horse manure placed in piles and packed compactly quickly generates heat so that a temperature as high as 140 to 160 degrees F. is produced at depths greater than eight inches. Fly larvae are killed very soon by temperatures of 115 degrees F. or above. The manure should be piled on hard bare ground and beaten down each day. Before flies can breed

in the top layer it is buried by fresh manure and becomes heated, killing the larvae. Accordingly very few flies can breed in such heaps. The generation of heat is facilitated by moisture, so in very dry weather the heap should be moistened daily. If manure does not

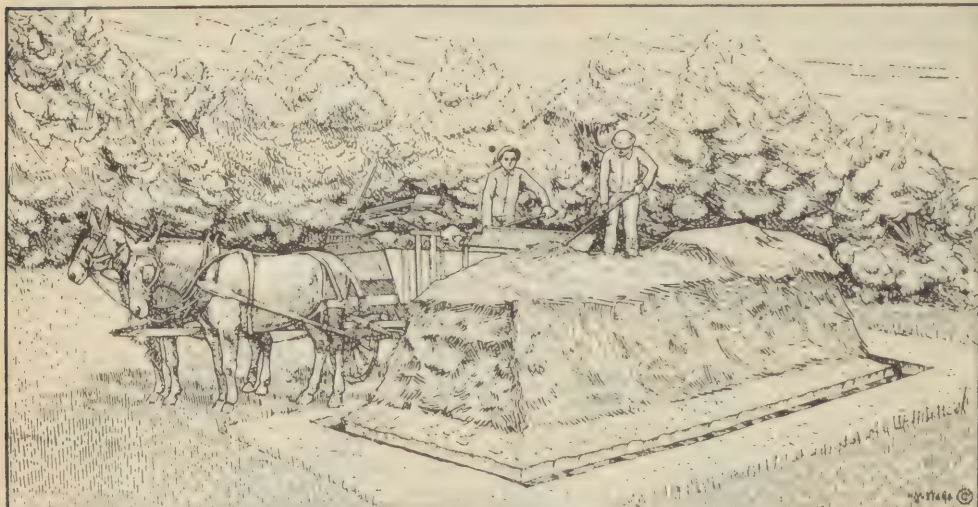


Plate 9. Composting Manure.

accumulate fast enough to prevent the surface layers breeding flies the heap may be covered with a thin layer of puddled clay or soil or even with oiled burlap, or the sides may be stripped at intervals of three days and the manure buried.

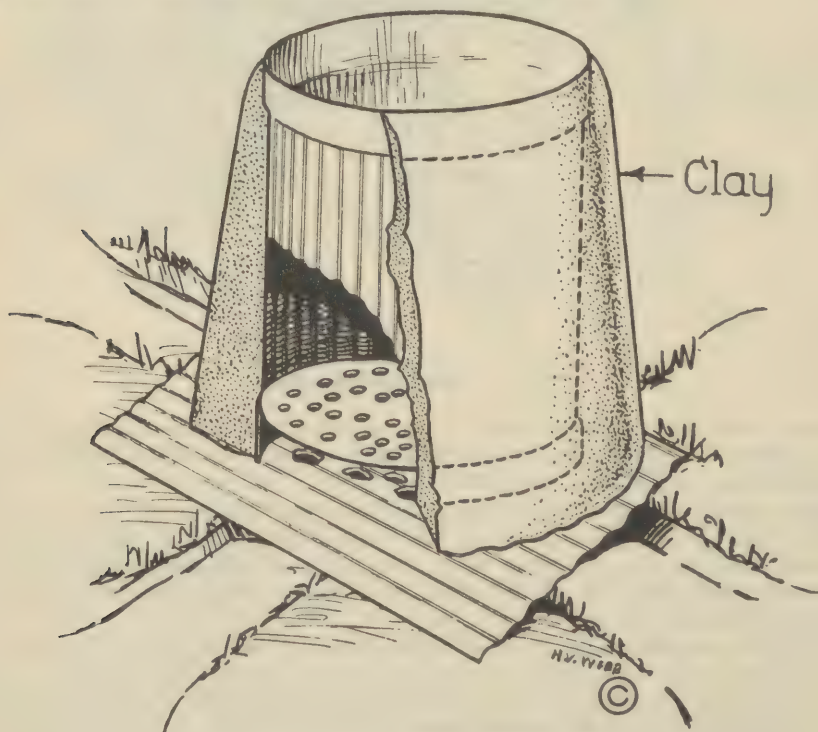


Plate 10. Cross Trench Incinerator.

Any flies that manage to survive this composting process will migrate into the surrounding dry soil to pupate. In order to kill these the area around the compost heap should be smoothed off for a space of four feet on the four sides and the soil packed down with crude oil weekly.

Drying manure. When manure is disposed of by drying it is spread in thin layers over the ground, one to two inches thick. All lumps should be broken up and the manure spread evenly. Flies cannot breed in dry manure, so care should be taken that the layer is thin enough to receive the full effects of the sun. When dried the manure may be stacked or burned, or be left as fertilizer.

Burning manure. Manure may be disposed of by burning. This may be accomplished by making windrows or stacks, or by incineration. If the former two methods are used, the manure is sprayed with crude oil and burned. If prepared incinerators are used they may be of the same kind used in the disposal of garbage, or more open ones may be employed. An easily constructed and efficient manure incinerator may be made out of railroad rails (or any long iron bars) elevated on bricks or piers and set as a grid. Care should be taken not to tramp manure into the ground around the incinerator and thus create a breeding place for flies.

Garbage Disposal. Garbage consists of waste food and the non-edible portions of food-stuffs, together with waste materials resulting from their preparation. It should not include tin cans, rubbish, or sweepings. (See Plate 11.) The amount produced is from

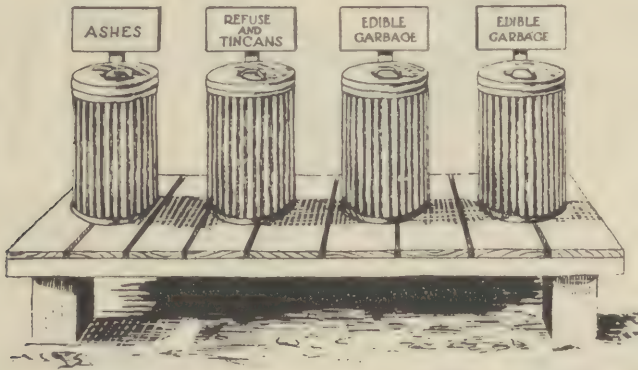


Figure 1. One method of labelling garbage cans for the collection of classified garbage. Concrete garbage stand.

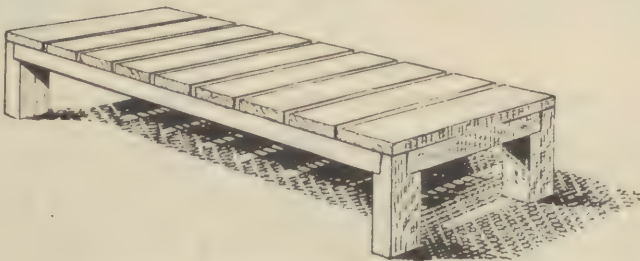


Figure 2. Garbage stand made of planks.

Plate 11. Garbage Stands.

two ounces to one pound per man per day, averaging 0.8 pound per man in large camps or about eight tons for an infantry division daily. Of this amount 65 to 80 per cent is water and the rest solids. About 85 per cent of the solids is combustible.

In bivouacs or temporary camps disposal of garbage is best accomplished by *burial*—construction of trenches of two to three feet in depth and of sufficient size to accommodate

the garbage and allow a back-fill of eight to ten inches of dirt. Shallow covering will allow more rapid decomposition but may be uncovered by storm drainage; therefore, a sufficient back-fill must be used. The area used should be over 200 feet from camp. Crude oil should be sprayed on the garbage after unloading.

In temporary camps when burial space is not available *incineration* must be resorted to, and that is accomplished by an open type of incinerator (Plate 10). A barrel-and-trench garbage incinerator can be easily constructed from an old garbage can or by molding clay around a wooden barrel, placing grates in the bottom. Garbage should be drained as much as possible and then the solid garbage should be fed slowly into the incinerator from the top. (See Plate 12.) A hot fire is required constantly. Disposal of the waste liquid is discussed below.

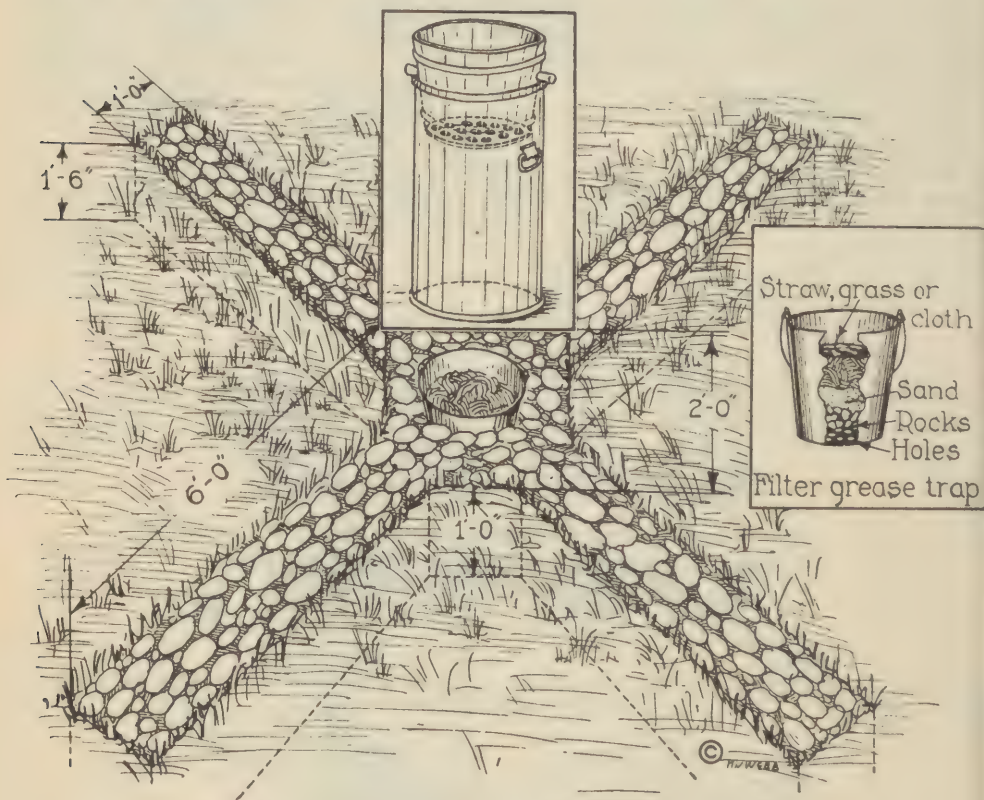


Plate 12. A Garbage Strainer and a Soakage Trench Showing Filter Grease Trap.

In large camps and permanent stations garbage is frequently disposed of by contract to farmers and contractors. Some camps having over 500 troops can dispose of garbage by maintaining a hog farm; this requires rigid sanitary control to avoid becoming a nuisance. However, it is an economical method of disposal, and a personnel of 500 will support 10 to 15 hogs with edible garbage. Burial would consume too much space.

Disposal of Liquid Wastes. In camps, liquid waste must be disposed of by soakage pits or trenches or by hauling away in cans and emptying at some isolated spot. Most of these wastes, especially those from the kitchens and messes, are heavily charged with grease which, if not removed, clogs the soil, prevents absorption, and gathering on the surface makes an unsanitary nuisance. In order to remove such grease it is necessary to construct grease traps.

Soakage pits are the best means of disposal of waste liquids. Pits for such purposes are made exactly like urine soakage pits and should be provided with ventilating funnels

for the same reason. Where there is a substratum of impermeable clay, of rock, or the ground water level is very close to the surface, soakage pits cannot be used and in their stead *soakage trenches* are made.

The *soakage trench* (Plate 12) is made by digging a pit two feet square and one foot deep. From each corner trenches are dug six feet long, being one foot deep at the pit end and eighteen inches deep at the extremities to provide for a flow outward from the pit. These trenches are about one foot wide. The whole is filled with broken stone, loose rubble, broken bottles and the like. A grease trap is installed in the center of this system. No ventilation is necessary as the pit and trenches are so shallow.

The principle by which these pits operate is the same as that of a sewage purification system by contact beds. A film forms on the contact material (loose rock) which contains many aerobic bacteria. These act on the contained organic matter of the liquid and oxidize it.

A soakage pit four feet square and four feet deep will, in ordinary soil, take care of the waste liquids from kitchen and mess of a full war-strength infantry company (200 men). A soakage trench of the dimensions given above will do the same. In impervious soil more pits will have to be constructed. These soakage pits and trenches are usually located in the vicinity of the company messes.

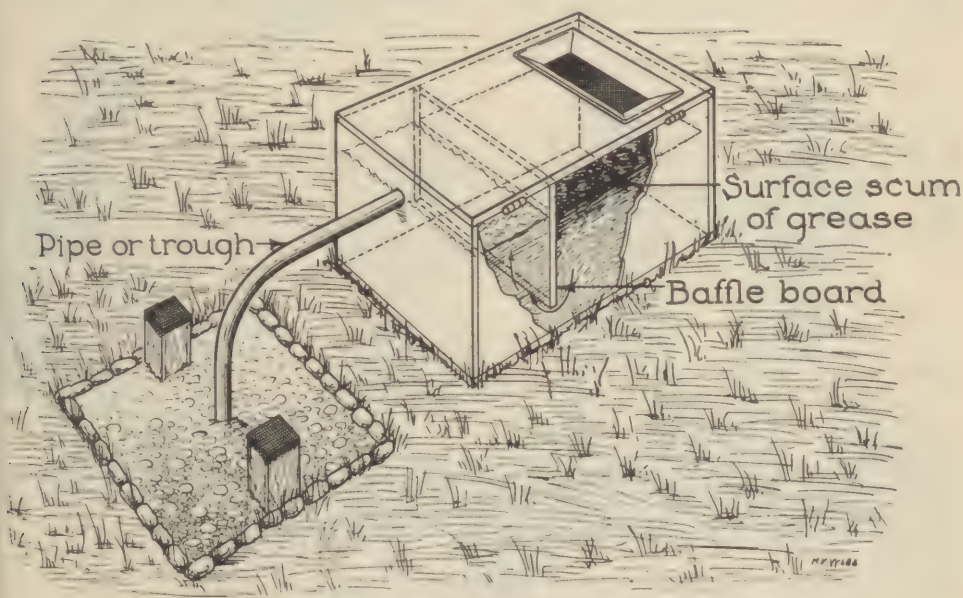


Plate 13. Baffle Grease Trap.

The pits may become sluggish in their absorption owing to collection of too much grease and organic matter. In such cases it may be well to let the pit rest a few days until oxidation can occur, a second pit being used in its place. Occasionally organic growth clogs the interstices between the pieces of contact material. This may be killed by a ten per cent solution of caustic soda or calcium hypochlorite in five gallon doses on alternate days until the growth disappears. It may be necessary to loosen the surface of the soakage pit with a pick.

Grease traps are of two kinds, filter traps and baffle traps. The filter grease trap may be made from a galvanized iron pail or a large tin can with many holes punched in the bottom. The can, pail, half barrel, tub, or whatever is used is filled as follows: On the bottom is a layer of gravel, next is a layer of sand, and above that is a mass of straw, hay, grass, or cloth which filters out the coarsest fragments in the liquid such as crumbs, pieces of vegetables, and meat, etc., as well as retaining part of the grease. Such a trap is placed in the center of a soakage pit with the bottom buried about two inches below the surface. All waste water is poured through the trap. (Plate 12.)

A baffle trap is a container (half barrel or wooden box) that is divided into two chambers, an influent and an effluent chamber, by means of a baffle plate. The lower edge of the baffle plate does not come to the bottom of the barrel but is separated from it by a space of about one inch through which water passes from one chamber to the other. A pipe or trough leads from the effluent chamber to the soakage pit nearby. (Plate 13.)

The baffle trap should be kept filled with cold water at all times. The warm waste liquids are poured into the influent chamber where the grease rises to the surface and is prevented from passing to the effluent chamber by the baffle plate. Some form of coarse filter should be placed over the mouth of the influent chamber in order to catch the larger fragments of food and debris. The retained grease is removed at intervals by skimming off from the surface of the influent chamber.

In bivouacs and camps of very short duration waste water should be disposed of by dumping on the surface of the ground or into shallow open trenches. Trenches should be back-filled with earth when abandoned.

Other Wastes. Incombustible wastes should be hauled to some regular dump at least 1000 yards to the leeward of camp. Tin cans should first be burned in order to destroy the organic matter in them and then smashed or punctured so that they cannot hold water and serve as a breeding place for mosquitoes. If they cannot be burned, they should first be thoroughly freed from their contents by rinsing them with hot water or steam.

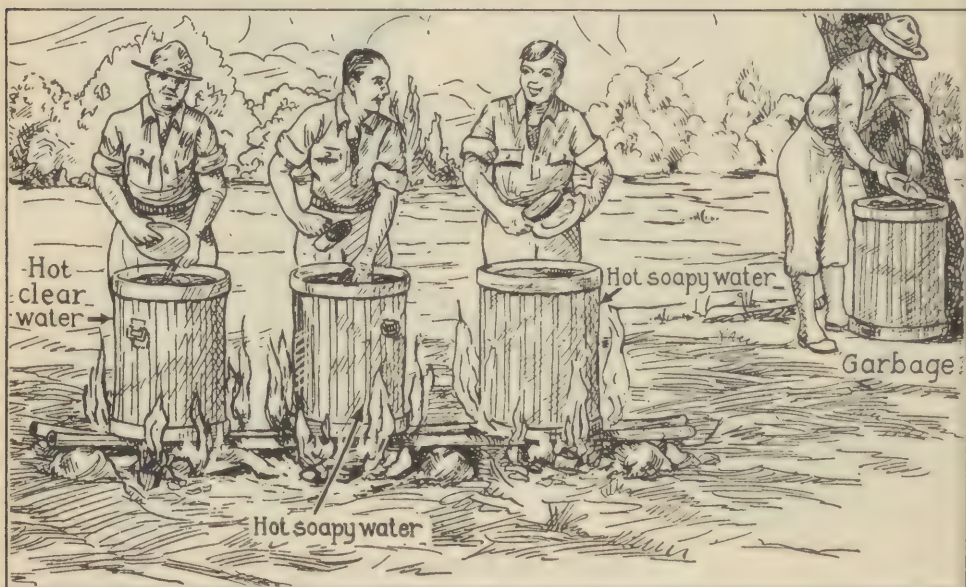


Plate 14. Washing Mess Kits in the Field.

Papers and rubbish which can be readily burned should be burned. They should be collected in separate cans and not mixed with the garbage, especially if the garbage is to be fed to animals.

Carcasses should be sold when practicable. Otherwise they should be disemboweled, the intestines punctured to release gas, and the viscera buried. The carcass is then dragged over this spot, the body cavity filled with combustible material, and the whole soaked with oil and burned. The carcass becomes charred and is unattractive to flies. It should then be buried.

Salvage material which is of no future value should be so demolished as not to hold water and serve as breeding places for mosquitoes. Such is especially applicable to oil and fuel containers, truck bottoms, fenders, or other articles which will retain water after a storm.

Dumps should be kept orderly; that is, all combustible material should be burned, all other materials covered, and surface drainage provided by means of ashes or dirt. If used over a long period, the top soil should be seeded with grass as completed.

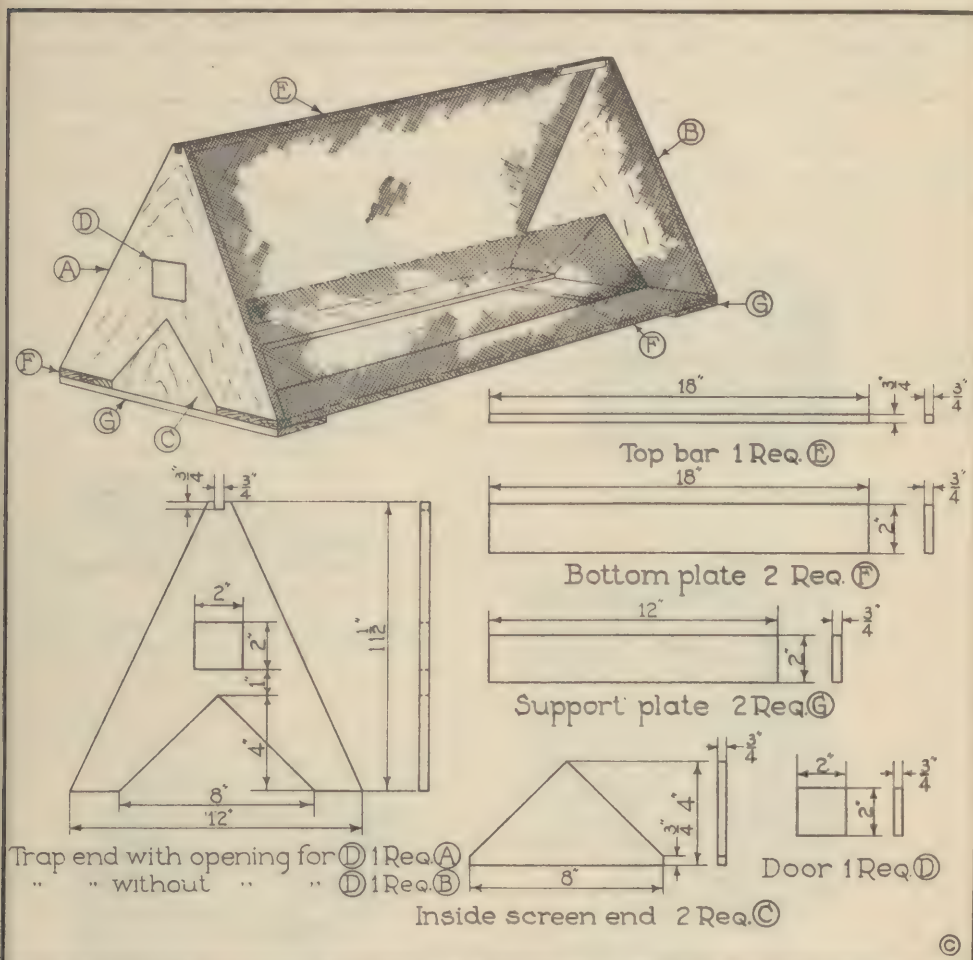


Plate 15. A Practical Fly Trap.

FIELD MESSES

The company mess is a very potent factor in the transmission of intestinal diseases, and to a lesser degree, of respiratory diseases. Furthermore, the character of the mess has a decided influence on the morale, physical fitness, and natural resistance of the individual. The basic consideration of mess sanitation is cleanliness. The essential features in proper mess sanitation are inspection and supervision of food handlers; inspection, protection from dirt and flies, storage, and preparation of food; cleansing and protecting from dirt and flies of mess gear and kitchen utensils; control of flies; and exclusion from the vicinity of the mess of any factors which might result in the contamination of food.

The normal field ration may be supplemented by local purchase of vegetables and fresh fruits. It is important that the ration be adequate, the menu varied, and the food well cooked. If necessity demands the purchase of meats, the medical officer or veterinarian should closely inspect it for any indication of inferiority or contamination.

Cleanliness of Food Handlers. Food handlers should invariably maintain rigid personal cleanliness, especially in the field where hygiene demands more effort. The unit commander is responsible for the physical examination of all permanent food handlers. (Par. 12, AR 40-205 and Par. 37, FM 21-10). The term permanent food handler applies to all persons who are permanently assigned to duties that pertain to cooking and serving meals, as well as dish washers and kitchen helpers other than temporary

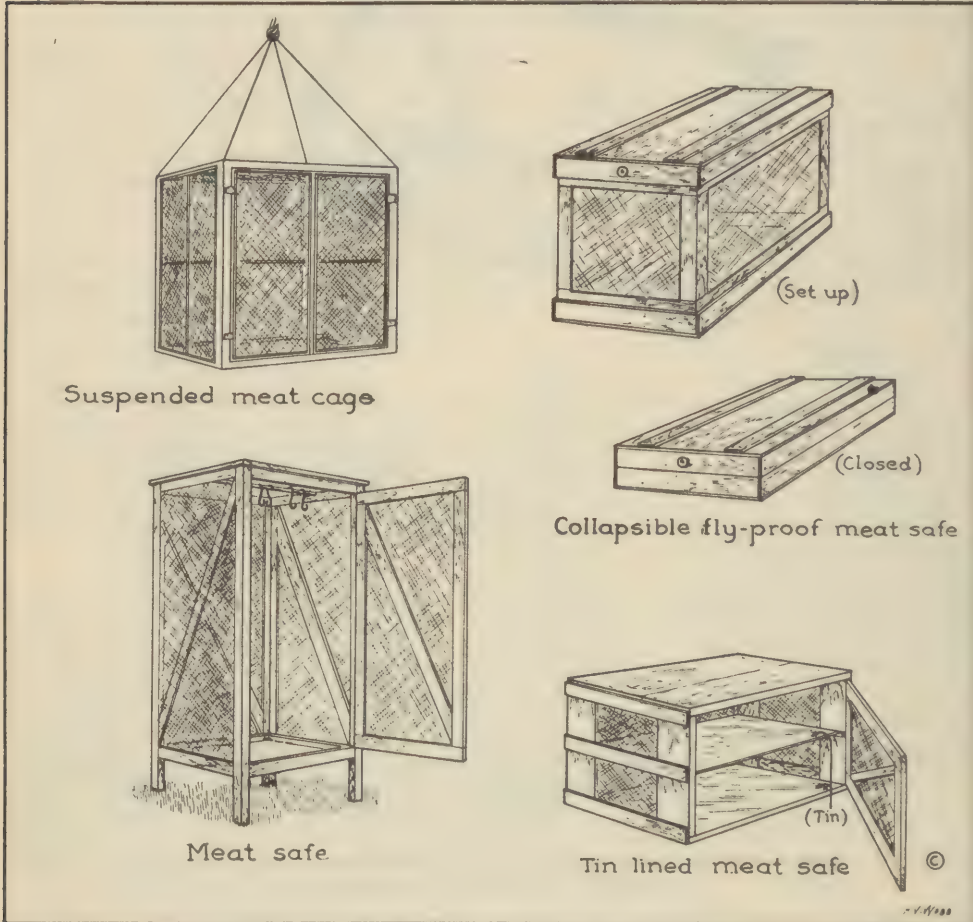


Plate 16. Improvised Meat Receptacles.

kitchen police. Unit commanders are required to send the names of all permanent food handlers to the surgeon. These men are then examined for clinical evidences of venereal disease, acute or chronic respiratory diseases, evidences of other communicable diseases and, if the surgeon deems it advisable, the stools are examined for causative organisms of the various intestinal diseases. The names of the men free from evidences of disease are then sent to their unit commander and posted in a conspicuous place in the company mess. These food handlers must be observed carefully by the unit commander and surgeon to detect any indication of disease or failure to maintain proper personal hygiene.

Cleaning Mess Kits. Mess kits are used in the field, each soldier being issued one for his own use. It consists of a meat can, knife, fork, and spoon. Each man is required to clean it after every meal, and this like all other utensils used in the preparation of

food must be thoroughly washed and sterilized in boiling water. This is done as follows (Plate 14): Three large galvanized iron cans are filled with hot water, the first two containing hot, soapy water and the other hot clear water. Each man scrapes his mess kit and dumps the food scraps into a garbage can supplied for the purpose. He then passes his kit through the hot, soapy water and then through the second container with hot, soapy water. He then passes his kit through the hot, clear water and dries it by shaking it in the air. The hot water is kept as near boiling as possible throughout the entire process. The water should be changed after 100 mess kits have passed through, if in any way practicable.

Fly Control. Fly control is important to field messes as well as in permanent garrison. Flies are controlled by destruction of breeding grounds, by trapping, swatting, poisoning, fly sprays, and by fly wires and paper. A practical form of fly trap is shown in Plate 15. Mess tents should be screened in camps of some duration, such as summer camps or rifle ranges. Screened meat cages that are hung above the ground and screened meat safes may be improvised from boxes (Plate 16). Every effort should be made to avoid having food come in contact with flies. It is a difficult task in the field where many adverse factors influence cleanliness. However, the care of safe-guarding food from fly contamination is small in comparison to the effort necessitated in caring for those sick with intestinal diseases. Foods should not be allowed to stand unprotected but should be placed in their proper places. This is true of staples such as sugar as well as fresh foods. Whenever a fly lights he may leave disease germs which have been carried from some source of bacterial growth.

Sanitary Inspection of Messes. The principal purpose of a sanitary inspection of a mess is to determine the existence and nature of any defects which would result in contamination of the food and the transmission of disease-producing organisms to the troops, or which would impair the nutritive value or lessen the acceptability of the food as served to the troops.

The following outline may be followed in making a complete sanitary inspection of a mess. It is suggested as a guide only:

Attendants:

- Is mess sergeant qualified for position as to—
 - Knowledge of food requirements and preparation of food?
 - Ability to maintain discipline?
 - Business ability?
- Are cooks adequately trained? How?
- Have food handlers all had "food handlers' " examination and been certified as to health condition by the surgeon?
- Are food handlers cleanly as to—
 - Clothing?
 - Hair?
 - Hands (inspect fingernails)?
 - Personal habits? Care in washing hands after urination and defecation.
- Is there a convenient washroom for food handlers?

Menus:

- Does food served correspond with menu posted?
- Are menus well balanced and amount of food adequate?
- Check file of menus and mess account balance sheet.

NOTE:—Daily food supplied each man should yield at least 3000 calories, provide at least 100 grams of protein, and contain adequate vitamins.

Food supplies:

- Meat and fish:
 - Source.
 - Quality.
 - Freshness.
 - Handling.
 - Storage.
 - Preparation.

Milk and dairy products:

- Same consideration as meat.
- Has bacteriological and chemical analysis been made?
- Is milk raw or pasteurized?
- Fruit and vegetables:
 - Is supply adequate and satisfactory?
 - Are men educated to their use?

Canned foods:

- Is supply satisfactory?

Bread and bakery products:

- Source.
- Quality.
- Delivery method.
- Storage.

Food storages:

Refrigerator:

- Is space adequate?
- Condition and sufficiency.
- Cleanliness.
- Disposal of drip water.

Pantries:

- General neatness, cleanliness, and adequacy of storage facilities.

Vegetable storage:

- Have vegetable bins been provided?
- Condition of vegetables in storage.
- Do facilities for storage guard against undue wastage by rotting?

Bread boxes:

- Sufficiency, cleanliness, and neatness.

Food preparation and serving:

- Refer to cooks' training.
- Is food served in a reasonably attractive manner?

Could you eat and enjoy the meals served and as served to the men in your organizations?
If not, what corrections are advisable?

Police:

Dishwashing:

Does the method meet the requirements of Army Regulations?
Are trays, dishes, and utensils clean? Look between fork tines and around hilt of knife.

Kitchen utensils:

Are pots and pans kept grease free?
Are they properly stored when not in use?
Are knives and forks clean? Look around handles and hilts.
Is there a rack and a knife sharpener?
Are stoves kept clean?
Is fuel supply adequate?

Kitchen police:

Cleanliness of floors, walls, and ceilings.
Are dirty rags allowed to accumulate on ledges, top of bread box, top of refrigerator, etc.?
Are personal belongings of mess attendants allowed to accumulate in kitchen?

Waste disposal:

Is waste handled in a cleanly, satisfactory manner inside the kitchens and storerooms?
Is vegetable preparation and peeling carried out in a neat and satisfactory manner?
Is waste properly sorted and kept in proper receptacles?

Ashes.

Combustible trash and tin cans.
Edible garbage for piggery.
Nonedible garbage.
Are empty cans crushed and perforated before going to the trash can?
Has a trash and garbage stand been provided?
Is it kept clean?
Is the surrounding area kept dry and free from soil pollution?
Is waste removed at reasonable intervals?
Are clean containers provided at reasonable intervals?
How and by whom are containers washed?
How are wastes disposed of:
Ashes to dump? Location of dump?
Combustible trash burned? Where?
Garbage incinerated? Or sold?
If garbage is sold, are terms of contract being met as to—

Frequency of collection?

Method of collection?

Cleanliness of cans?

Insects and rodents:

Is mess screened adequately?
Is there a supply of fly swatters or other fly destroyers? Are they used?
Have fly traps been provided and are they kept properly baited and set up for use?
Are roaches and other insects present? If so, what method is being used to control them?
Are rodents troublesome? What steps have been taken for their destruction?

Meat and Food Products. Except in an emergency, food products of animal origin such as meat and meat products, poultry and eggs, fish and other seafoods, as well as all dairy products, usually arrive at the consuming organization after careful and thorough inspections by various civil and military inspecting agencies that have had as their purpose the protection of the health of troops by preventing the introduction of deteriorated or contaminated products into organizational messes.

Appropriate Army Regulations place the responsibility for the inspection of food products of animal origin on the Veterinary Corps of the Medical Department whose purpose is to protect the health of the troops by preventing the purchase or issue of meat and dairy products which, by reason of their source, nature, handling, or condition, may be unsafe or unsuitable for food purposes. As a sanitary procedure, this is a direct extension of the sanitary service maintained by the Medical Department which assures a safe sanitary product up to the point of issue to troops.

However, when improperly handled and stored, meat and meat products are subject to rapid deterioration and during the time products remain in the company kitchens, messes, or refrigerators, very careful supervision should be exercised by medical officers to assure the use of only sanitary products.

Spoilage of Meat. Meat is considered to be unsound which has deteriorated or undergone any undesirable changes. The meat of a healthy animal is free from bacteria, and all bacterial decomposition is due to contamination subsequent to slaughter. It is not practicable, however, to prevent a certain amount of contamination during the handling of meat so that all fresh meat is more or less contaminated with bacteria and fungi. Where the meat is properly handled, the contaminating organisms are nonpathogenic but they may cause spoilage of meat. Under insanitary conditions the meat may be contaminated with pathogenic organisms. In meat which has been thoroughly dried and properly chilled, the bacteria grow slowly and the bacterial penetration is delayed while a moist and improperly chilled product is conducive to rapid bacterial growth and penetration. Bacteria may penetrate rapidly and deeply into the tissues by growth along moist surfaces between muscular tissues or through open vessels causing areas of de-

composition in the deep parts of the tissues and around the bones without evidence of surface deterioration.

Preservation of Meats. In order to prevent or retard bacterial invasion resulting in decomposition, products must be stored in a temperature which is not conducive to bacterial growth or cooked sufficiently to destroy bacteria or fungi present. Meat which has been properly handled prior to receipt will usually remain free from decomposition for from 6 to 10 days if immediately placed in a temperature of about 35° F. However, the average ice box or refrigerator maintains a temperature of from 45° F. to 55° F. and is not satisfactory as storage for more than 72 hours. It is essential that meat under refrigeration be hung in such a manner as to follow free circulation of air around it. Covering or wrappings should be removed to hasten chilling process.

Small Refrigerators. A small refrigerator or ice box should be desirably located, preferably away from heat of stoves or direct rays of the sun. It should be cleaned every day and well iced. Doors should be kept closed to conserve refrigeration. Meat should not be stored in the ice compartment and never in contact with ice as the ice may not be clean, also the meat will become wet and this hastens spoilage. Drain pipes should be sanitary and open. Food compartments should not be overcrowded and meats should be unwrapped and so placed as not to retard circulation. At 55° F. it is possible to keep good, fresh, dry meat for 24 to 36 hours; at 45° F. three days or more; while above 57° F. the refrigerator is inefficient. A good thermometer should be used in each refrigerator.

Temporary camps. In temporary camps, meat and meat and dairy products may be stored for a short time in watertight containers and immersed in springs or streams, care being taken to prevent contamination. Food may also be buried below the surface of the ground in underground ice boxes.

Disease transmission. Any disease, the causative organisms of which can be conveyed by food to a point of invasion within the body, may be transmitted by food. The diseases most frequently transmitted in this manner are those belonging to the intestinal group such as typhoid fever, the food infections, dysenteries, and diarrheas, but food may also be the transmission agency for other diseases such as tuberculosis, scarlet fever, and diphtheria. Diseases due to a pre-formed toxin, of which botulism is an example, may be caused by food in the sense that the food carries the toxin from the point of origin in infected food to the alimentary tract of man.

Meat poisoning, botulism. The inspection of meat offers but little safeguard against the meat poisoning group of bacteria and botulism, or sausage poisoning, for the reason that the micro-organisms may pervade the meat without in the least changing its appearance, color, flavor, or odor. Thorough cooking will destroy the infection and eliminate the danger of meat poisoning and botulism but the cooking must be thorough and it must be remembered that the *bacillus botulinus* grows well in cooked foods.

Sanitary Inspections of Meat. Assuming that all prior inspections have shown the product to be acceptable up to the point of issue to the consuming organization, a further and final safeguard is essential in order to assure that deterioration or contamination has not occurred subsequent to issue and prior to consumption. This is accomplished by the sanitary inspection of products exercised by the responsible medical officer. The sanitary inspection within the company or organization mess should include the appearance of a package or product as an indication of prior handling, evidence of prior official inspection, as well as evidence of contamination, deterioration, and adulteration. Inspecting officers should be familiar with the appearance, color, odor, flavor, consistency, and other factors in order to determine acceptable sanitary conditions.

Color. The color of fresh meats depends mainly upon kind, age, conditions at slaughter, and part of the carcass from which derived. Choice fresh beef should be a bright cherry red; veal should be pinkish brown; mutton, a dark pink or red; lamb, a light pink, and pork, a light pink.

Odor. Meat should be free from any abnormal odor. Decomposed meat may be detected if it has a strong, sour, disagreeable, musty, mouldy, or other off color. Putrid odors are usually due to ammonia or hydrogen sulfide. Rancidity of fats may be determined by the odor or flavor. A steel trier or knife may be used as an aid in the examination for odors, passing the trier into the tissue especially in the vicinity of bone and withdrawing for evidence of decomposition.

Consistency. Sound meat should be reasonably firm to the touch and should barely moisten the

finger. Meat should not be flabby or pit on pressure. If, upon examination, meat or meat food products are found to be affected with an unsoundness of slight or limited extent, which in the opinion of the inspector can be removed by trimming, wiping, or other manipulation, this action should be taken followed by reinspection to determine condition of the product. If the unsoundness involves any considerable proportion of the carcass or cut and in all doubtful cases, the carcass or cut should not be used for food. The removal of surface rancidity or sourness may be accomplished by wiping with a dilute vinegar or baking soda solution.

Cured meats. Cured meats showing deep tissue decomposition, insect infestation, rancidity, sourness, or extensive mold or slime should not be used for food. Slight degrees of mold or slime may be removed by washing or wiping the surface with a dilute vinegar or soda solution.

Canned meat foods. Canned meat foods should be examined carefully for evidence of defective containers allowing contamination of the contents or of improperly processed contents resulting in spoilage dangerous to health. Defective cans are readily detected and are classified as leakers, swellers, or springers (AR 40-2200).

Leaker. A leaker is a can presenting a defect through which air may enter or the contents escape. If the defect is small, leakage may be indicated only by the removal of the vacuum and the disappearance of the concavity in the ends or sides of the can.

Sweller. A sweller is a can which contains gas in sufficient quantities to produce bulging or distention of the sides or ends. The gas is usually due to contamination with gas-producing organisms resulting in incomplete sterilization or infection subsequent to sterilization.

Springer. A springer is a can in which gas within the can is sufficient to cause a disappearance of the normal concavity from one end or side. External pressure on the flattened or bulging side causes the other end or side to flatten the bulge.

All leakers, swellers, and springers should be rejected for food. The presence of *bacillus botulinus* in canned foods is noted by its characteristic foul odor. Such foods should not be used for food and should not be tasted.

Poultry and Eggs. The term *poultry* includes chickens, ducks, geese, turkeys, and such other domestic birds as may be used for food. Poultry is generally subject to the same kind of contamination as meat products, though the tissues of poultry may afford a more suitable medium for the growth of organisms. While the diseases common to poultry are not readily communicable to man, very careful post mortem inspections are necessary in order to prevent the consumption of food contaminated with organisms pathogenic for man.

Inspection. Poultry will usually be received freshly killed, chilled, or frozen and should be undrawn, with head and feet on unless processed under supervision of Federal inspection agencies when they may be accepted fully drawn. Evidence of decomposition, slimy or sour carcasses, or any other unsoundness render the carcass unfit for food.

The term *egg* usually includes only chicken eggs and while they do not ordinarily serve as a transmitting agency for disease-producing organisms, it is possible for microorganisms to pass through the porous shell or reach the interior through a break in the shell.

Inspection. Eggs are inspected for freshness, soundness, cleanliness of the shell, color, and size. Candling and breaking are used to test the freshness or soundness of eggs. In candling, the unsoundness is indicated by mixing of the white and yolk, adherence of the yolk to the shell, blood rings, abnormally colored yolks, movable air cells, discolored whites, or foreign bodies. Unsound eggs should not be used for food. If, upon breaking, a considerable proportion are unsound, the entire lot should be discarded. An efficient candling apparatus may be easily constructed by placing a lamp or electric light bulb in a can, shoe box, or other receptacle through which has been cut a hole about the size of the small end of an egg. The egg is placed to this hole through which the light shines allowing the inspector to determine the internal condition of the eggs.

Fish and Sea Foods. From the time *fish* are caught until finally consumed they should be handled, transported, and stored under proper and sanitary conditions. Otherwise, rapid deterioration characterized by putrefactive decomposition will occur. The flesh of fish may contain chemical poisons which will produce illness in man or it may serve as a transmitting agency for disease-producing organisms. Most of the fish so affected are found in the tropics. The toxic substance is usually found in the ovaries and eggs but may also be found in the head and liver. Inasmuch as the toxic substance is not removed by boiling, the most careful supervision must be exercised to assure the removal of these

portions of the fish. In some localities, various types of fresh water fish (pike, perch) may contain the encysted larvae of the fish tapeworm which, when ingested in a viable state, develop into the adult forms in the intestines. Thorough cooking will destroy the larvae. Smoking, drying, salting, or freezing will not destroy the larvae.

Sound, fresh fish which have been properly handled and packed in ice may be held in storage at a temperature of 32° F. for 10 to 14 days. However, strictest care should be exercised to prevent variation of temperature. Should fish be defrosted they should be consumed promptly. Fish should be defrosted gradually in a cooler or refrigerator and not exposed to heat or soaking in either hot or cold water as this action will lessen the palatability and food value.

Inspection. In the inspection of fresh chilled fish, certain characteristic indications of soundness should be sought. If a fish is fresh and sound, the following conditions will be noted:

Gills. Bright red, usually closed, no abnormal odor.

Eyes. Prominent appearance, transparent cornea.

Scales. Adherent.

Skin. Free from malodorous slime, not discolored.

Flesh. Firm, only transient indentations by pressure with fingers.

Body. Stiff, tail rigid.

Carcass. Will sink in water.

The carcass of any fish showing evidence of unsoundness, injury, or contamination should not be used for food.

Many individuals exhibit idiosyncrasies to *fresh shellfish*, such as oysters, clams, crabs, shrimp, etc., which are usually manifested by urticaria, nausea, and vomiting. These symptoms should not be confused with those of food poisoning.

Inasmuch as oysters thrive best in water, the salinity of which is less than sea water, many of the producing areas are located where the sea water is diluted with fresh water. Some of these areas may be contaminated with the effluents of sewage systems. The production and handling of oysters are governed by State laws and regulations insofar as factors which result in contamination, deterioration, or adulteration are concerned and the shipment in interstate commerce is prohibited by Federal laws. The use of oysters or other sea foods should be confined to products handled under jurisdiction of State or Federal agencies.

Inspection. Oysters may spoil or become stale after being shipped or they may become contaminated during transportation. Hence, a piece inspection should be made for evidence of spoilage, staleness, or adulteration. Oysters whether in the shell or shucked are highly perishable. They deteriorate rapidly when improperly handled and present a characteristic, disagreeable odor or a gassy or milky appearance. Oysters may show a green or pink discoloration and while there is no evidence that they are detrimental to the health of the consumer, they are generally regarded as undesirable for food and should not be used. Ordinarily, only canned crabs, clams, shrimps, and lobsters are used in Army messes, but should they be furnished fresh, the inspection is, in general, the same as for oysters.

It is considered that all *canned sea foods* have been prepared under official supervision of civilian or military inspection agencies and that the quality of product and method of processing is satisfactory. However, deterioration of the canned product is subject to spoilage or damage and the product should be subject to sanitary inspection prior to use.

Inspection. The inspection is made by examination of the unopened can and the contents of suspected or selected cans. If the contents of the can are sound, the ends of round cans and the sides of square or flat cans are concave. Should the ends or sides become flattened or bulged, it may be due to a defect in the can allowing air to enter, or to decomposition of the contents with gas formation. Cans presenting defects through which air might enter or contents escape or which "bulges" or "swells" as the result of gas formation should be rejected for food. Upon inspecting suspected cans, care should be taken when opening the can not to damage contents. The contents should be carefully examined for abnormal odor, appearance, or taste indicative of decomposition. The inside surface of the can should be inspected for evidence of black discolorations due to chemical reaction. Any abnormal odor or appearance should be considered as indicative of decomposition and as a cause of condemnation.

Milk and Dairy Products. *Milk* is a most important agency of transmission for certain pathogenic organisms. It is usually served in an uncooked state and, consequently, many of the organisms which it may contain will be viable when ingested, therefore strict sanitary supervision during all stages of production is essential. When possible, the use of milk should be confined to establishments operating under supervision of the Army

veterinary inspection service. A dairy farm examination consists of an investigation into the sanitation of the dairy farm establishment and all parts, equipment, employees' health and hygiene of dairy animals, methods of operation, and products concerned.

Inspection. Under certain conditions it may be necessary to investigate the conditions under which milk is produced. All bovines on the dairy farm should be free from disease as shown by a thorough physical examination conducted by a qualified veterinarian. The barns should be well ventilated, providing at least 3 square feet of window space and 500 cubic feet of air space for each animal. Manure must be removed and disposed of in such a manner as to prevent fly breeding. All milking utensils must be of non-absorbent material, in good repair, and properly sterilized. Milk must be promptly cooled within 1 hour after milking to 50° F. and maintained at or below that temperature until delivered to the pasteurizing plant (AR 40-2230). All personnel concerned with milking or handling of milk should be familiar with the necessity of strictest sanitary precautions and be required to undergo careful periodical physical examination to assure freedom from contagious or communicable disease.

Pasteurization is the heating of all particles of milk or milk products to a temperature of not less than 143½° F. and holding at such temperature for not less than 30 minutes in approved pasteurization apparatus. The hygienic condition of fresh milk depends to a considerable degree upon the conditions existing at the source of supply. Insanitary milk due to diseased animals or contamination at the source is correctible only in part, therefore it is necessary that milk be obtained from healthy cows and produced and handled under hygienic conditions even when it is pasteurized.

Inspection. Inspection of pasteurizing plants requires, in addition to a thorough knowledge of the pasteurizing process, an adequate understanding of the equipment, its construction, installation, and operation. Pasteurizing plants should have in satisfactory operation vats or holders in which the temperature of the milk is raised to at least 143½° F. and held for 30 minutes, automatic devices for registration of the pasteurizing temperature, coolers wherein the milk may be rapidly cooled to 45° F. or less after pasteurization, automatic bottling and capping machines, automatic bottle washers, and facilities for cleansing and sterilizing all parts of the pasteurizing equipment with which the milk comes in contact. All milk bottles should be sterilized before being filled and all pasteurizing equipment sterilized immediately before being used. Cleanliness throughout is essential in the operation of a milk plant. Pasteurization plants should be efficient and meet all sanitary requirements as to construction, equipment, personnel, products, and methods of operation. An ample supply of safe water and steam for cleansing and disinfecting purposes is essential. Doors, windows, and other openings should be screened and kept in good repair.

Milk issued to troops for beverage and cooking should be grade A pasteurized. When this is not obtainable, grade B pasteurized milk may be used. The use of bulk milk should be discouraged and the use of raw milk should not be countenanced. If grade A or grade B pasteurized milk is not available, evaporated milk should be used.

Inspection. Samples for bacteriological and chemical analysis should be frequently obtained for laboratory tests. These should be packed in ice and promptly transferred to the laboratory. If laboratory facilities are not available locally, a sample should be furnished corps area laboratory for analysis (AR 40-310). Use a sample of 1 quart of milk and pour it 25 times between sterile containers. Then add 1 cc of commercial formalin to the quart of milk and agitate thoroughly. Fill sample bottle flush with lower end of stopper and fasten securely. Label specimen, furnishing following information: Station from which sent, date of collection, nature of specimen, specific examination required, name of establishment from which milk was obtained, and the word "formalized."

Milk should be placed in clean refrigerated storage at a temperature of 45° F. promptly upon receipt. Underground ice or cooling box may be utilized for short storage periods. Bottled milk should not be submerged in water for cooling because the contraction of the contents accompanying the cooling process may create a sufficient vacuum within the bottle to suck in water around the edge of the cap resulting in possible contamination.

Condensed milk is primarily fresh milk from which a part of the water has been removed and to which sugar may or may not have been added.

It should be stored at temperatures below 60° F. and above freezing and the cases should be occasionally turned in order to offset the tendency of the fat to separate and of the milk to solidify. Long storage is undesirable due to tendency of acid content of milk to react on metal of the container producing off flavors, solidification, or swells due to hydrogen gas.

Inspection. Deterioration of condensed milk is evidenced by the formation of gas, the development of abnormal tastes or odors, or by discoloration. Cans presenting the above conditions should be rejected for food. Certain of the constituents of milk may settle out to form precipitates, however, this does not necessarily indicate that the milk is unsuitable for food. Such supplies should, however, be very carefully examined for evidence of other conditions which would render the product unfit for food.

Butter is the fat derived from milk or sweet or sour cream, formed into a mass together with water and small amounts of other natural constituents of milk, such as curd, lactose, and acid. It is essential that the production of butter be safeguarded in the same manner as the production of milk.

Butter exhibits a marked tendency to absorb odors and tastes from other substances and for this reason should not be stored in the same place or close to odorous substances such as fish, cheese, or certain vegetables. If butter is to be held for any considerable length of time it should be placed in *cold storage* at a temperature of from 5 to 10 degrees below zero F. where it may be held for as long as 6 months without deterioration. Butter should not be held at temperatures of from 20° F. to 30° F. for longer than 1 month and storage space should be kept dry and clean.

Inspection. Sanitary butter should be clean, sweet, of an agreeable aroma, palatable, of fine texture and grain, and should not contain adulterations, insects, or foreign substances. It is bright in color and of a light straw shade.

CLEANING AND DISINFESTING DEVICES

Bathing Facilities. Ablution benches where the men can wash should be constructed half way between the latrines and the company tents. These benches need not be very elaborate, but the drainage from them should be carefully planned so as to be well spread over the ground in a system of branching trenches and ditches. Improvised shower baths may be made out of five-gallon gasoline cans or from a barrel (Plate 17). All pits, ditches, and bathing areas as mentioned above should be at least 100 feet from any source of drinking water.

Laundry Facilities. Soldiers should be encouraged to keep their clothing clean, especially underwear and socks. In over night camps or bivouacs of short duration the men wash their clothing at designated places in nearby streams. In camps of longer duration laundry benches should be provided. The same care of drainage water should be taken as that described above for bathing.

Every opportunity should be taken to dry wet clothes. Socks may be hung on the outside of the pack while marching. Tents with stoves should be strung with wires or a screen of burlap erected around the stove, inside of which wet clothes are hung. If possible all clothes should be dried in the sun, especially socks, in order to destroy fungus growths (athlete's foot).

Disinfestation may be required in some instances. Large steam disinfestors are supplied to large commands. These consist of big pressure sterilizers or autoclaves, weighing some nine thousand pounds, mounted on iron wheels, in which at least one atmosphere of pressure may be developed.

For smaller organizations improvised disinfestors and delousers must be used. The most available of these is the Serbian barrel. It consists of a barrel or cask with holes drilled in the bottom and set on top of a boiler. In order to make the device steam tight at the junction of the barrel and boiler a sausage ring of oiled sandbags is placed between the boiler and the barrel. The weight of the barrel pressing down on this ring prevents the escape of steam. A small framework of crossed sticks is placed inside the barrel to keep clothes off the bottom. The whole is then filled with clothes and a heavy lid placed on top (Plate 18). In order to be successful steam must be generated in sufficient quantity to fill the barrel in about one minute. This requires a vigorous fire. The time required for sterilization is 45 minutes after steam commences to escape.

A less valuable improvised disinfestor is the steam sack. An inverted sack is filled with clothes, and steam is led into the top by means of a pipe. The steam penetrates all parts of the sack before emerging at the lower end which is drawn to a small opening by a purse string. Owing to a slight pressure being caused by the tight packing of clothes, the heated steam is raised to a few degrees above boiling (212 degrees F.)

Sanitary Survey and Report. A sanitary survey is a study of the conditions of a military camp or post which are either favorable or unfavorable to the health of its personnel. A sanitary report is the summarized information obtained from a sanitary survey, including conclusions and recommendations as indicated.

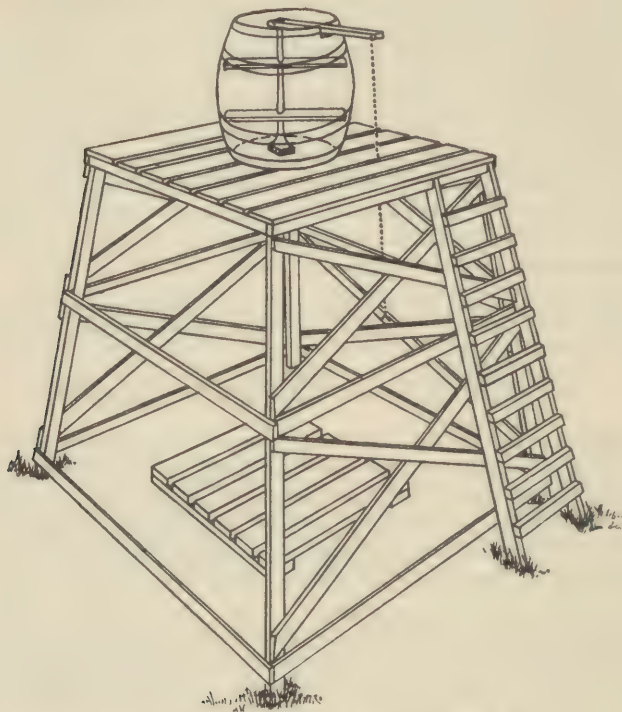


Plate 17. Improved Shower Bath.

Sanitary surveys have three functions. The first is to learn—to collect information. The second is to teach—to inform the commander and others as to the sanitary conditions and to spread the idea that good health is possible and that a healthy army is a strong army. The third is to utilize the collected facts as a basis for action, as a means for discovering sanitary short-comings, and as a guide in making recommendations for improvements.

Certain basic features of any community or military post must be considered: social factors, economic conditions, environmental conditions, and local prevalence of diseases. The health of a command is influenced a great deal by the health conditions of its adjacent civilian population and community. Personal inspection and study must be given to all these considerations, and a physical inspection of the sanitary installations and factors affecting sanitation of the command must be made. A definite scheme of making the survey should be written or thought out clearly before attempting it. Information should be secured from local health authorities, visiting civilian physicians, hospitals, dairies, packing houses, water supply and purification plants, and sewage disposal plants.

Features which can be improved by the command should receive closer study. The proper recommendations are then made. Defects and deficiencies of military installations can usually be corrected.

The medical officer making a sanitary survey does not possess the authority to order the institution of corrective measures except when such authority is delegated to him by proper military headquarters. His function is advisory and not one of command. The report may be either oral or written. There are several types of sanitary reports; special, monthly, yearly, and general.

Special reports: Special reports cover occasional emergencies, usually in written form, and will be rendered as necessity demands. Their purpose is to place immediately before commanding officers information regarding grave sanitary defects, epidemics, or other serious conditions that are affecting or may immediately affect the health of the command. In all such reports appropriate recommendations for the correction of existing defects or for prevention of extension of epidemics or threatening epidemics should be incorporated.

Monthly reports: Monthly reports are rendered for each station or tactical command in the field within three days after the end of each month. The purpose of the report is to keep the commanding officer and higher administrative authorities in touch with current sanitary and health conditions within a station or command and with defects which may influence the health of the command. To insure uniformity the following headings, numbered serially, are used in rendering these reports:

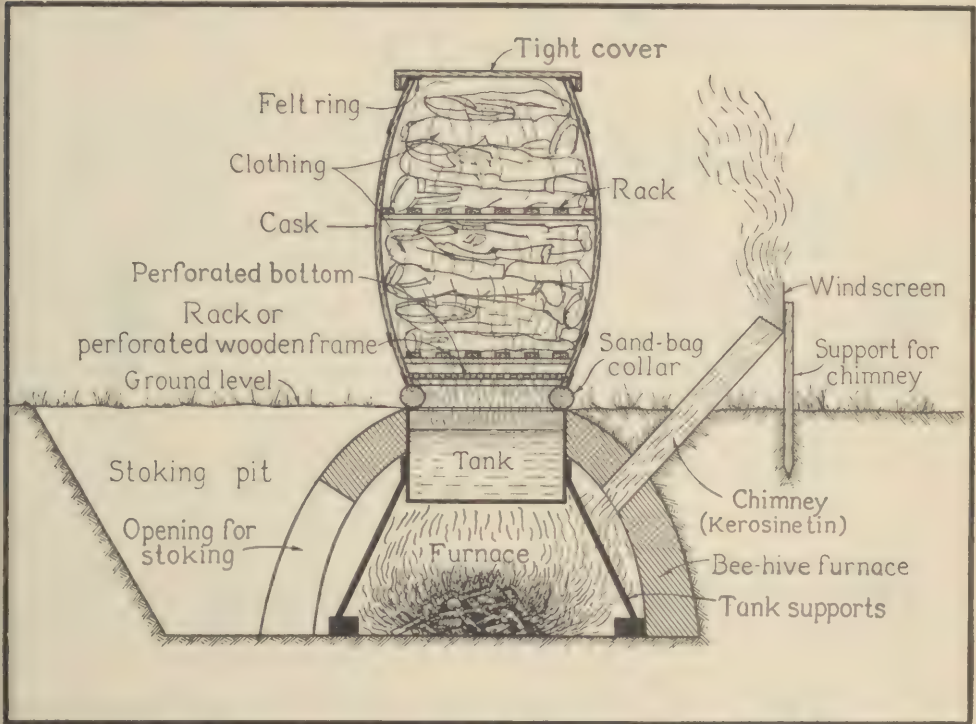


Plate 18. The Serbian Barrel for Disinfestation of Clothing.

- (1) Mean strength of command for month:
Military.
Civilian.

- (2) Environmental sanitation:

This includes any changes or additions to drainage system, public buildings, water supply, disposal of wastes, food supplies, methods for eradication of disease-bearing or other insects, or other matters connected with environment that have occurred during the month. If no changes have occurred, the statement "Satisfactory" will suffice.

- (3) General statistics:

The following statistics for the period extending from midnight of the last Friday of the previous month to midnight of the last Friday of the current month:

Mean strength of command (military personnel).

Admissions to sick report (all causes—use no decimals).

Rate per 1000 per annum for month of _____ 194—.

Rate per 1000 per annum for preceding month of current calendar year.

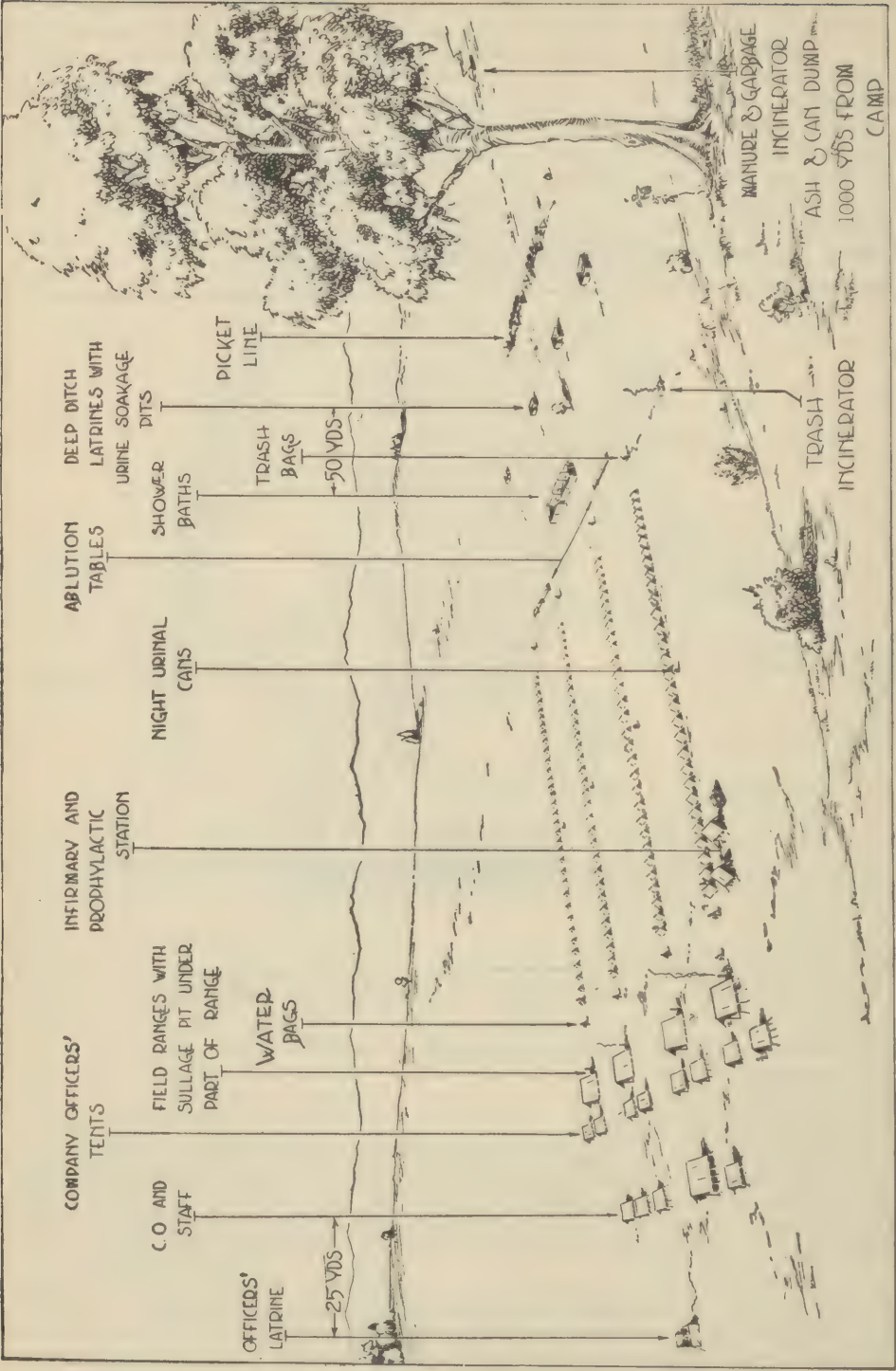


Plate 19. Diagram of a Proper Sanitary Layout for a Battalion Camp.

Rate per 1000 per annum for corresponding month of preceding year.

Rate per 1000 per annum for the preceding calendar year.

Marked variations in the four comparative rates and probable or actual explanation for the variation should be noted.

(4) **Personal hygiene:**

Report of physical inspections as to whether or not there are new cases of venereal diseases or an undue prevalence of acute communicable diseases. The status of immunological procedures should be included. Also include endemics or epidemics that may occur, their origin, the means of probable dissemination, and special measures instituted for their control. If none, the statement "None have prevailed" will suffice.

(6) New or improved administrative measures and sanitary appliances: Report improved or new sanitary appliances, health conservation or administrative measures of proven or potential practical value, either in garrison or on field service. If these have been the subject of special reports, attach copies thereof. If none, the statement "None" will suffice.

(7) Subjects not covered under other headings.

(8) Recommendations: Recommendations must be made for correction of all sanitary irregularities, for the improvement of existing or the institution of new appliances or for the adoption of administrative measures for the protection of the health of the command. If there are none, the statement "None" will suffice.

Yearly report. The December report in addition to the data for the monthly report will contain brief resumé of the year. Summary of important sanitary defects and deficiencies reported during the year with corrective action taken will be included.

General report. The purposes of general reports are to inform higher authorities regarding sanitary conditions and related matters as viewed by medical inspectors of corps, department, or tactical command, or by general medical inspectors. They contain facts, conclusions, and recommendations concerning efficiency of Medical Department administration and personnel, care of equipment, sufficiency of hospitalization, and other allied subjects.

Disposition of Sanitary Reports. The final dispositions of the above reports in addition to the file copy retained of each at the originating command are as follows:

Special: To station or other commander send two copies; file one copy as an exhibit to go forward with the monthly report.

Monthly: Send in duplicate to The Adjutant General through channels.

Yearly: Send as December report in duplicate to The Adjutant General through channels.

General: Original through inspector's immediate superior to the Surgeon General and in duplicate to the station commander.

Sanitary reports are very powerful instruments in maintaining a high degree of sanitary efficiency and excellence.

Sanitary Order. Upon arrival in camp a camp sanitary order is necessary in order to designate the layout of the various sanitary devices in their relation to the rest of the camp's interior economy, as well as to lay down the sanitary rules and regulations by which the life of the camp is to be governed. Plate 19 shows a suitable layout for a battalion camp with its sanitary devices and the correct distances from the tents at which each is established. Terrain features will not always permit such an arrangement.

The camp sanitary order is usually drawn up by the senior medical officer of the command and by him submitted to the commanding officer who publishes it as an order. In general it fixes the responsibility for sanitary conditions in the camp, outlines the status of the surgeon, designates proper inspectors and police officers, lays down the rules governing the water supply and sterilization of water, and the conduct of messes together with the handling of food and the control of permanent food handlers, outlines the methods for the disposal of wastes and human excretions, the disposal of manure, the control of insects, the disinfection of clothing, the care of tentage and quarters, the location and function of the venereal prophylactic station, the periodic physical inspection of troops (Army Regulations require a monthly physical examination in which the detection of concealed venereal disease is only a part), enjoins observance of the rules of personal hygiene, designates the location

of the medical tent or dispensary, and gives such other information or instructions as may be required for the preservation of the health of the command.

A detailed outline of the contents of a camp sanitary order, with references to pertinent Army Regulations, appears below:

Headquarters Inf.,
Camp
Place
Date

General Order

No.—

1. *General.* The following provisions for the sanitation of this command are published for the information and guidance of all concerned:

- a. Responsibility of the unit commander for the sanitary conditions of the command.
 - b. The surgeon of the command: Duties and responsibilities in all matters relating to the health of troops and sanitation.
 - c. The medical inspector: Authority and general duties. His reports to be made direct to the surgeon of the command. The general police officer when one is designated. His relation to the surgeon and to the medical inspector of the command.
 - d. Water supply: Where obtained for drinking purposes, cooking, watering of animals, bathing and washing of clothes. Only water from authorized sources to be used. Flagging of streams. Installation, care, and protection of water sterilizing bags. Chlorination of water. (Par. 10, AR 40-205.)
 - e. Food and messes: Food, messes, mess halls, and kitchens. Responsibility for. Preservation of food and foodstuffs. Cleanliness of all food handlers, utensils and fixtures in all kitchens, messes, bakeries, exchanges and welfare huts. Mess kit washing. (Pars. 11, 12, 13, and 14, AR 40-205.)
 - f. Waste disposal: Separation and disposal of all wastes, garbage, rubbish, and tin cans. By whom removed, time of removal, and method to be employed in final disposal. Incinerators, type to be constructed, number, location, size, and how to be used and cared for. (Par. 15-16, AR 40-205.) Disposal of human excreta. Location of, type, number, and size of latrines to be used and constructed. Location, type, number, and size of urine soakage pits to be constructed. The use of urinal cans during the night hours. Responsibility for the care and cleanliness of all latrines, night urinal cans, and soakage pits. Burning, sunning, and airing. Treatment with chemicals, general policing. Latrine guards. (Par. 16, AR 40-205.) Disposal of manure. Location, care, and cleanliness of the picket lines and corrals. Removal and disposal of manure. Time of, by whom accomplished, and how finally disposed of. (Par. 21, AR 40-205.)
 - g. Quarters: Superficial floor space and cubic air space per individual. Space between beds. Care of the floors, orderliness and cleanliness. Ventilation, exposure to sunlight, airing of all bedding and clothing. Overcrowding. Arrangement of beds for sleeping and relation to one another. (Par. 19, AR 40-205.)
 - h. Insect control: Fly prevention; destruction of breeding places. Materials to be used in the prevention of fly breeding. Destruction of flies. Fly traps and fly bait. (Par. 21 AR 40-205.) Mosquito prevention; survey of the entire area. Establishment of proper drainage. Treatment of water holes, stagnant pools, and low ground near slow running streams. Methods to be employed in the prevention of breeding and destruction of mosquitoes. Protective measures to be taken by the command. Screening. (Par. 20, AR 40-205.)
 - i. Personal hygiene: Washing of hands, bathing, and the washing of clothes. Shaving and cutting of hair. Care of the feet. Fitting of shoes and socks. (Pars. 7, 8, 9, AR 40-205.)
 - j. Dispensaries: Establishment, location, and how marked by day and night. Time and place of sick call.
 - k. Venereal prophylaxis: Location of stations, number of, and how marked by day and night. (AR 40-235.)
 - l. Physical inspection: Time and place. Examination of all troops upon arrival and departure from camp. Immunization, character, time and place. (AR 40-215 and AR 615-250.)
 - m. Special measures for control of communicable diseases: Detection of disease; presence in camp of first case is source of all trouble. Cooperation of all officers and men is required. (Par. 2, AR 40-205.) Disinfection and disinfection; treatment of individuals. Treatment of clothing and bedding. (Pars. 22 and 23, AR 40-205.)
2. *Civilians.* All civilians and civilian organizations attached to this command will comply with this order in so far as it applies to them.

By order of

Official:

Adjutant.

Distribution:

General.

Vital Statistics. The Medical Department officer in the field has to be familiar with elementary statistical methods as there are certain reports which require, not only the reporting of the absolute number of cases, but the rate of occurrence.

A *statistical rate* is the number of times an event occurs in a definite number of people during a given period of time. In order to calculate a rate the following must be known:

- (1) Frequencies of the event (cases, deaths, etc.).
- (2) Strength.
- (3) Period of time.

Army vital statistics are figured as rates per 1000, that is, a strength of 1000 is used as a base. In other places 10,000, or 100,000 may be used, but it is best to use the same figure at all times in order to make rapid and accurate comparisons.

In addition, Army rates are estimated on an annual basis. That is, a rate of so many cases per 1000 per annum. If in a command of 1000 men there are 10 cases of measles during any one month and the rate per 1000 for the year is desired, the 10 would be multiplied by 12. The result in this case would be 120 and as there were 1000 troops, the rate would be 120 per 1000 per annum. Here we have assumed that the same number of cases would occur during each of the remaining eleven months of the year. In most cases the strength is not in even thousands so additional calculations are required.

By *strength* is meant the number of individuals present at a certain time or during a certain period. To obtain the average strength of a command for a given number of days, the strengths for each day are added and divided by the number of days in the period, the result being the average strength.

Methods of Computing Rates and Ratios. The following formula will be found valuable in *computing rates* per 1000 per annum for any period:

$$\frac{\text{Number of events in the period} \times 1000 \times \text{One year (expressed in days, weeks or months)}}{\text{Mean strength} \times \text{Number of days, weeks or months in the period}}$$

To illustrate, suppose there were 12 cases of measles in a command of 610 in a 5-weeks' period. What is the rate per 1000 per annum?

$$\frac{12 \times 1000 \times 52}{610 \times 5} = 204.5$$

Here the number of events (cases) is 12 and this is multiplied by 1000 and by 52. The figure 52 represents one year expressed in weeks. This result is divided by the strength multiplied by 5 (the number of weeks in which the 12 cases occurred).

Suppose these cases had occurred in one calendar month, then

$$\frac{12 \times 1000 \times 12}{610 \times 1} = 236.0$$

In this case the year is expressed by 12, the number of months in one year, and the strength is multiplied by one, there being one month in the period.

If these events occurred, in say 18 days, then the formula would be—

$$\frac{12 \times 1000 \times 365}{610 \times 18} = 398.0$$

Most of the morbidity records prepared by camp or station surgeons cover a 4- or a 5-weeks' period so that the first example shown here would be the one to follow.

For a more extended discussion see FM 8-55 or TM 8-255 (now published as Army Medical Bulletin No. 23).

The *noneffective rate* is a daily rate and is the number of men sick in hospital or quarters per 1000 strength on the day for which it is calculated. The noneffective rate is employed to determine the number of troops in a given command that are physically fit for duty on a given day, or the average daily noneffectiveness caused by a disease during a selected period of time.

The noneffective rate for a given day may be calculated as follows:

$$\text{Noneffective rate} = \frac{\text{Number of sick} \times 1000}{\text{Strength}}$$

The following formula may be used to determine the average daily noneffective rate for a period of more than one day:

$$\text{Noneffective rate} = \frac{\text{Sum of number sick daily} \times 1000}{\text{Sum of daily strengths}}$$

The following formula may also be used to determine the daily noneffective rate:

$$\text{Noneffective rate} = \frac{\text{Total days lost}}{\text{No. of days in period}} \times \frac{1000}{\text{average daily strength}}$$

Thus, if in a command of 500 troops, 10 men are sick on a given day, the noneffective rate is 20 per 1000 troops. It is calculated as follows:

$$\begin{aligned}\text{Noneffective rate per 1000} &= \frac{10 \times 1000}{500} \\ &= \frac{10,000}{500} \\ &= 20\end{aligned}$$

If four cases of measles occur in a command of 500 troops during one month and these cases are sick for 10, 12, 14, and 14 days, respectively, the noneffective rate may be calculated as follows:

$$\begin{aligned}\text{Noneffective rate 1000} &= \frac{(10+12+14+14) \times 1000}{30 \times 500} \\ &= \frac{50,000}{15,000} \\ &= 3.33\end{aligned}$$

Or:

$$\begin{aligned}\text{Noneffective rate} &= \frac{50}{30} \times \frac{1000}{500} \\ &= 1.666 \times \frac{1000}{500} \\ &= 1.666 \times 2 \\ &= 3.33\end{aligned}$$

In 1928 the total United States Army, consisting of 134,380 troops, lost 73,144 days from duty because of influenza, or, as expressed by the noneffective rate, 1.49 men out of every 1000 troops, were incapacitated for duty each day of the year. This is determined by the following calculation:

$$\begin{aligned}\text{Noneffective rate per 1000} &= \frac{73,144 \times 1000}{365 \times 134,380} \\ &= 200.39 \times \frac{1000}{134,380} \\ &= 200.39 \times 0.00744 \\ &= 1.49\end{aligned}$$

In the report of venereal diseases the *prophylactic rate* is required. That is, the number of men per 1000 strength who have taken venereal prophylaxis during the month. This rate is obtained as follows:

$$\text{Number of prophylactics administered} \times \frac{1000}{\text{Average daily strength}}$$

Ratios are used to express relationships between frequencies of occurrence of related events. Ratios are usually expressed in percent (per 100). A case fatality rate is the ratio of deaths from a specific disease to the number of cases of the disease. If during an epidemic of meningitis there were 120 cases and 30 of them died, the case fatality rate would be 25 calculated as follows:

$$\begin{aligned}\text{Case fatality rate} &= \frac{30 \times 100}{120} \\ &= 0.25 \times 100 \\ &= 25\end{aligned}$$

ESSENTIALS OF MILITARY PREVENTIVE MEDICINE

Definition. Military preventive medicine includes the measures which are necessary for the prevention and control of diseases among the members of military forces. It is comparable to the activities of the public health service of civilian communities, as modified by military environmental conditions. It has a definite and important role in the mission of the Medical Department.

The mission of the Medical Department is the conservation of man power—the preservation of the strength of the military forces. It accomplishes its mission by three methods; *first*, by accepting for the military service only those men who are physically fit; *second*, by keeping these men physically fit through the application of the principles of preventive medicine; and *third*, by restoring to physical fitness, as promptly as possible, through the application of curative medicine, those who become disabled.

Soldiers are subject to the same diseases as people in civil life. In some respects they encounter greater health threats. Their life involves concentration in compact military communities, with a resulting exposure to large doses of mixed and crossed infectious material. Their exposure to hardships and hunger, which lower their natural resistance, and to sudden changes of environment tends to make them more susceptible to the communicable diseases than would be the case under normal civilian conditions. Therefore, the medical officer must fortify his knowledge of curative medicine with the principles of preventive medicine. Basically, sanitation and hygiene are factors in preventive medicine and are necessarily included in the study of that subject.

Historical Background. In most wars the loss of military man power from disease has greatly exceeded the losses of men in battle. Even during the World War our losses from disease exceeded our battle casualties. History records many examples of important campaigns which have failed because of outbreaks of disease among the troops. The map of the world, as we now know it, undoubtedly would have been quite different if outbreaks of disease had not prevented military leaders from accomplishing their missions. Much of this enormous loss was due to preventable disease, before mankind emerged from a state of relative medical ignorance. It is only in recent decades that we have come to know much about the basic causes of the diseases that wrought such havoc among men assembled in armies and have devised ways and means to prevent such losses.

COMMUNICABLE DISEASES

Definition. The designation “communicable diseases” is used to cover all those infectious or contagious diseases transmitted from person to person by direct contact, indirect contact, or through some special transmitting agent. They are all caused by “germs” of one kind or another; in some, the specific germ is known, while in others it is not known. They are the diseases which, under favoring conditions, appear in epidemic form.

Epidemics. An epidemic exists when a large number of persons in a community are affected simultaneously by a certain disease or suffer its effects within a short space of time. To have an epidemic outbreak of communicable disease three things are necessary:

A focus, or source, of the disease.

Susceptible individuals.

Proper contact between the susceptible individuals and the source of the disease.

Classification of Communicable Diseases. Communicable diseases which affect military personnel may be classed for the most part under five general headings:

First, Diseases which are transmitted by the intestinal discharges and then acquired by ingestion of infected material. They are commonly called *food* or *water-borne* diseases.

Included in this class are:

Amoebic dysentery (protozoal)

Botulism

Cholera

Diarrhea (common)

Dysentery (bacillary)

Food infection

Parasitic infestations (helminthic)

Paratyphoid fever

Typhoid fever

Undulant fever

Second. Diseases which are conveyed by the secretions of the mouth, nose, and throat of infected people and which gain entrance to the body of the uninfected through those portals. This method of transmission is commonly known as "droplet infection." These are the *respiratory diseases*. Diseases which can be placed in this class are:

Bubonic plague (pulmonary)	Pneumonia (lobar and bronchial)
Chicken pox	Pneumonia (secondary)
Common colds	Poliomyelitis
Diphtheria	Psittacosis
Encephalitis (epidemic)	Scarlet fever
Influenza	Septic sore throat
Measles	Smallpox
Measles (German)	Tuberculosis (pulmonary)
Meningitis (meningococcic)	Vincent's infection
Mycotic diseases of the lungs	Whooping cough

Third. Diseases which are dependent upon exposure to insects, known as the *insect-borne diseases* as they are usually transmitted by blood-sucking insects. The diseases in this class are:

Bubonic plague	Relapsing fever
Dengue	Rocky Mountain spotted fever
Filariasis	Trench fever
Leishmaniasis (oriental sore, es-pundia, and kala-azar)	Trypanosomiasis (African sleeping sickness and Chagas' disease)
Malaria	Tularemia
Pappataci fever	Typhus fever
Pseudotyphoid meningitis (Swine-herd's disease)	Yellow fever

Fourth. The *venereal* diseases in which the infection is usually transmitted by direct contact during sexual intercourse. The diseases in this class are:

Chancroid	Lymphogranuloma inguinale
Gonorrhea	Syphilis

Fifth. Diseases requiring control measures not included in the above headings and which might be listed in two or more of the above classes are as follows:

Anthrax	Ringworm (tinea cruris)
Beri-beri	Scabies
Infectious jaundice	Scurvy
Leprosy	Tetanus
Rabies	Trachoma
Rat-bite fever	Yaws

The diseases for which *notification to Public Health authorities* is usually required in the states and cities of the United States are:

Actinomycosis	Influenza
Ancylostomiasis (hookworm disease)	Leprosy
Anthrax	Malaria
Chicken pox (varicella)	Measles (rubeola)
Cholera	Meningococcic meningitis
Conjunctivitis (acute infectious)	Mumps (parotitis)
Dengue	Paratyphoid fever
Diphtheria	Plague (bubonic, septicemic, pneumonic)
Dysentery (amebiasis)	Pneumonia (acute lobar)
Dysentery (bacillary)	Poliomyelitis
Encephalitis (infectious, lethargic, and nonlethargic)	Psittacosis
Favus	Puerperal infection (puerperal septi-cemia)
German measles (rubella)	Rabies
Glanders (farcy)	Rocky Mountain spotted (or tick) fever
Gonorrhea	Scarlet fever (scarlatina)

Septic sore throat (streptococcic throat infection)
 Smallpox (variola)
 Syphilis
 Tetanus
 Trachoma
 Trichinosis
 Tuberculosis (pulmonary)

Tuberculosis (other than pulmonary)
 Tularemia
 Typhoid fever
 Typhus fever
 Undulant fever (brucellosis)
 Whooping cough (pertussis)
 Yellow fever

Botulism, pellagra, food infections and poisonings, although not considered communicable, are also reported since they usually occur in groups or epidemics, and their prevention is practicable.

Diseases or infestations for which notification of Public Health authorities is not everywhere required are as follows:

Ascariasis
 Climatic bubo
 Coccidioidal granuloma
 Common cold
 Filariasis
 Ictero-hemorrhagic jaundice (Weil's disease)
 Impetigo contagiosa
 Lymphogranuloma venereum (inguinale)

Pediculosis
 Yaws
 Rat-bite fever (sodoku)
 Relapsing fever
 Ringworm
 Scabies
 Schistosomiasis
 Vincent's infection (angina, stomatitis)

Biological Sources. Every case of communicable disease comes from some other case of that disease; air, water, food, utensils, insects, and all other such means are merely the agents which carry the germs from the infected person to well persons.

Geographical Sources. The geographical source of the communicable diseases that play such an important part in the health of the soldier is the civil community from which he comes as a recruit or the civil community adjacent to the military community where he resides.

Areas at large. In a concentration of military man power some men arrive at the rendezvous while in the earliest or incubation stage of measles, mumps, or other communicable disease. In a few hours, or a few days, they will be sick. These men are unaware of their exposure, and until symptoms appear there is no way to foresee their impending sickness. In the meantime they are necessarily coming in more or less intimate contact with other men among whom will be a certain proportion who are susceptible to the disease in question. After a short time some of these susceptible contacts will become sick with this same disease; by that time an epidemic may have started and, unless vigorous measures are taken to stop it, it will continue until all the susceptible material has been exhausted. Such infections increase in virulence by being exchanged between individuals who have been unaccustomed to them.

Local areas. Men in a military community will naturally come in contact with people of the adjacent community. Many of the communicable diseases are present at all times in civil communities, and susceptible soldiers will almost certainly be exposed to such diseases, acquire them and, of course, introduce them into the military community with the results outlined above.

Methods of Transmission of Communicable Diseases. Communicable diseases are transmitted in three ways: direct contact, indirect contact, or by a special agent. A "contact" is a person (or animal) known to have been sufficiently near a source of infection presumably to have been exposed to the transfer of infectious material, either directly or from articles freshly soiled with such material. As a contact the person is considered a potential carrier of the disease, although he may not display the symptoms of the disease in question.

A *direct contact* transmission of disease occurs when a susceptible person comes in close or intimate physical relationship with a person sick with the disease in its infective stage.

A few examples of diseases which may be transmitted by direct contact are: measles, mumps, smallpox, respiratory diseases, and the venereal diseases.

Transmission by *indirect contact* occurs where the susceptible person uses some article which has recently been used by a person sick with the disease in its infective stage. Some common examples of indirect transmission are: using towels, dishes, eating utensils, pipes, lighted cigars, cigarettes, and the like, that were in recent intimate contact with, or soiled by, the sick person. Influenza, as an example, may be spread by unsterilized eating utensils. The majority of the diseases transmitted by direct contact are also transmitted by indirect contact.

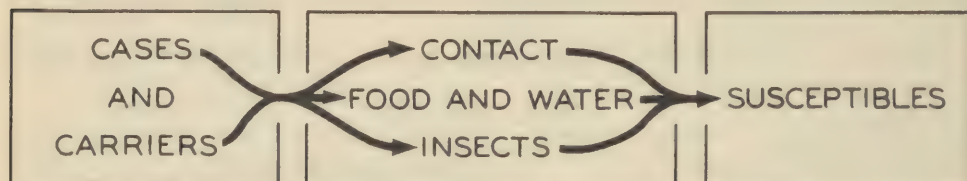


Plate 1. Factors in the Control of Communicable Diseases.

Transmission of communicable disease by a special transmitting agent occurs where the susceptible person's only contact with the sick person is through some intimate carrier of the germs of the disease. Examples of this mode of transmission of disease are: the mechanical transmission of typhus fever by lice, the biological transmission of malaria by the mosquito, and the transmission of typhoid fever by the healthy human carrier.

A "*carrier*" is a person who, without displaying visible symptoms of harboring a communicable disease, disseminates to others its specific micro-organisms. The diseases which are known to be transmitted by "carriers" are as follows:

Cholera	Paratyphoid fever
Diphtheria	Pneumonia
Dysentery (amebiasis)	Scarlet fever
Dysentery (bacillary)	Typhoid fever
Meningococcic meningitis	Vincent's infection

As distinguished from a "carrier," the term "*infected person*" designates a person in whose tissues the etiological agent of a communicable disease is lodged and produces symptoms.

Factors Influencing Communicable Disease. Several factors which may affect the severity and the dissemination of communicable diseases may be grouped into three general classifications: the degree of individual resistance to the given disease; the time of recognition, whether detected in the early stages of dissemination or after the exposure of many susceptibles; and the climate or environmental conditions which may enhance or adversely affect the individual resistance, or favor or limit the transfer of organisms causing disease from one individual to another.

Individual Resistance. Each person has a certain degree of natural resistance to infection by the communicable diseases. This resistance is relative, some having more than others. Resistance to disease is also "general" or "specific." The person of good physique and robust health is likely to have a good general resistance to many diseases. Specific resistance, or immunity, applies to certain diseases and may be acquired in several ways, as related below:

First: By having suffered an attack of a disease which confers a degree of immunity which will protect the recovered individual from another attack of the same disease. Smallpox is an example of such a disease, because individuals who have recovered from smallpox have not been known to have smallpox again during their lifetime.

Second: By repeated exposure to small doses of infectious material by which a resistance is built up without the individual ever being actually sick with the disease. Many individuals have been repeatedly exposed to diphtheria patients without ever contracting diphtheria themselves. It is believed that the exposure to small amounts of infectious

material can be tolerated without developing the major symptoms of the disease. The presence of the infectious material, however, stimulates the formation of antibodies in the blood against the particular disease; and, if the next dose of infectious material is not too large, this antibody formation is increased even more. By this process being repeated several times, the individual apparently develops sufficient immunity to resist doses of infectious material large enough to produce severe symptoms in the unprotected individual. Measles, chicken pox, scarlet fever, and mumps seem to fit into this classification in respect to some persons.

Third: By artificial immunization by means of vaccination against a given disease. The immunization may be produced either by the introduction of the dead organisms or the toxic material of such organisms into the human body. Typhoid fever organisms, for instance, are cultured, then destroyed, and made into a vaccine which is inoculated intramuscularly. The presence of these dead organisms stimulates the antibody formation of the individual concerned, and for a period of several years he has an increased resistance or immunity to typhoid fever. Smallpox immunity has been definitely acquired by artificial immunization. Many other diseases have given favorable indications that they can be controlled or lessened in their severity through these means.

There are many other factors which contribute both to an individual's general resistance to disease or the lack of such resistance. Previous environment, age, vitality, and race are among the more recognized ones.

Previous environment has much to do with the amount of resistance to disease a soldier has acquired by the time he enlists into the military service. In general, recruits from populous communities have been more frequently and more intimately exposed to infective material of many kinds than those from thinly populated areas. For example, the recruit who has always lived in the city very rarely reaches adult life without having had measles, while the young man who has always lived on a farm, and has had very few contacts with people other than his immediate neighbors, may or may not have had measles.

Age is a factor in the resistance of an individual because as individuals mature they attain more and more resistance, reaching their maximum in late middle life. Age increases both natural and specific resistance—physical stamina is greater, and antibody formation has been under process for all diseases to which the individual has been exposed. When physical stamina becomes lessened materially, as in the later years of life, the general resistance is decreased in spite of immunities acquired.

Vitality is another important factor in disease resistance. Men who are weakened by lack of adequate and proper food, by exposure to wet and cold, by physical or mental exhaustion, by confinement in close quarters, and by lack of proper exercise, are apt to become sick from whatever communicable disease is prevalent, unless they have specific immunity to it.

Racial resistance to some disease is known to vary. The white race, for example, has a greater resistance to pulmonary tuberculosis than negroes. Malaria is said to be tolerated better by the negro than the white person. Part of this racial resistance is hereditary and part is environmental.

PREVENTION AND CONTROL OF COMMUNICABLE DISEASES

Purpose. Preventive medicine, which includes measures for both prevention and control of communicable diseases, is formulated and health measures executed in accordance with the mission of the military force. These measures should be correct, feasible, and practicable. They should not interfere with the accomplishment of the military mission of the command. If, however, there is an epidemic of a communicable disease in a command, the control of this disease would be of paramount importance in order to prevent the loss of valuable manpower. The early consideration and use of preventive measures will often provide a protective barrier against disease and prevent epidemics.

Preventive Measures. In addition to the natural resistance of the individual, there are many precautionary measures which should be taken in order to prevent the outbreak and spread of communicable disease. These measures may be divided into four general classes:

First. Providing an environment that will prevent or limit the dissemination of infective material: proper housing—ventilation, heating, lighting, and cleanliness; insect control; and rodent control.

Second. Measures designed to maintain the health and vitality of the soldier: proper food, clothing, exercise, rest, sleep, and personal hygiene.

Third. Specific prophylactic treatment to confer immunity: artificial immunization against smallpox, typhoid, cholera, diphtheria, and other diseases against which specific immunity has been effective.

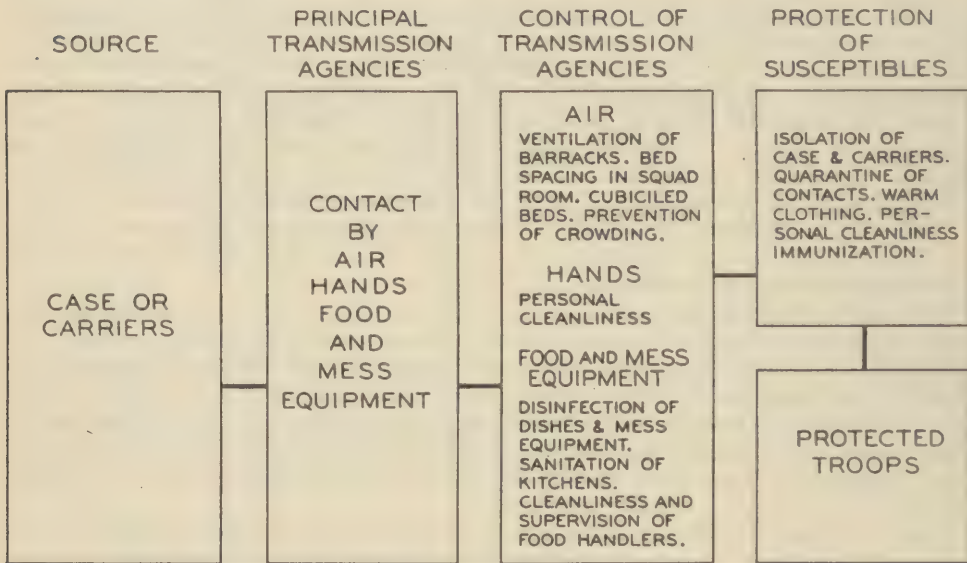


Plate 2. General Factors in the Control of Respiratory Diseases.

Fourth. The isolation of the sick, the quarantine of contacts, separating them from the well in order to prevent further spread of the disease. The effectiveness of this measure is dependent upon the early recognition and diagnosis of the sick.

Environmental Measures. A healthy environment is obtained by the proper housing of troops and the physical and chemical destruction of those pathogenic organisms that affect human beings directly or indirectly. The factors of housing involved in the prevention and control of disease are ventilation, heating, plumbing, screening, and lighting. The sanitation of the buildings occupied by troops is the responsibility of the unit commander; the construction and repair, and the ventilating, heating, and lighting facilities are responsibilities of the Quartermaster Corps. The medical officer of the unit makes recommendations based upon inspections in order to insure the observance of proper sanitary measures and maintenance of conditions which will promote and preserve the health of the troops.

Ventilation. Adequate ventilation is obtained by the use of proper methods of heating, correct construction of buildings, and the avoidance of overcrowding. Ventilation of the squad room need not be a difficult procedure. If the prescribed bed space is used, and if beds are arranged head to foot (see Plate 3), the occupants of the room will not so readily transmit pathogenic organisms to one another. Sixty square feet of floor space for each bed and 600 cubic feet of air space per man should be allowed exclusive of space utilized for wall lockers, foot lockers, furniture, and fixtures. The windows should be opened on top on one side (leeward) of the squad room, and at the bottom on the opposite side (windward). This is the most effective method of ventilation in the ordinary squad room. Mechanical air conditioning methods are not employed, as yet, in the ventilation of barracks or quarters. They are occasionally installed for the

ventilation of operating rooms in hospitals and in other special enclosures. It is not improbable that air conditioning will be used more extensively in the future to include barracks and other military establishments. Ventilating facilities should be adequate and used. Officers of an organization should inspect the men's sleeping quarters at night to see that they are well ventilated.

Overcrowding, though unavoidable at times, should never be condoned. It contributes to epidemics by increasing the number and intimacy of contacts, as well as by lowering the vitality of individuals. In extreme emergencies the minimum allowance may be reduced to 500 cubic feet of air space and 50 square feet of floor space per man.

Ventilation of tents used as quarters is also important. The hood of the tent should be open to allow air to escape. Side walls should be raised sufficiently to allow air to enter at the bottom of the tent. The tent walls should be rolled daily, permitting the interior to air thoroughly. The tent should be taken down, or furled, periodically and the interior exposed to direct sunlight. Sunlight has a definite bactericidal effect, and therefore when the interior of a tent can be exposed directly to sunlight the dissemination of bacteria is decreased.

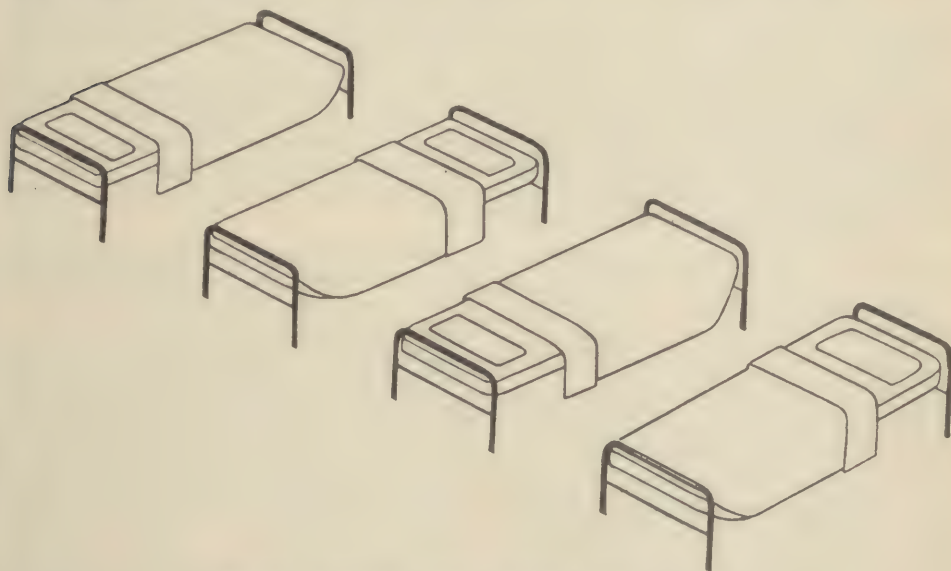


Plate 3. Head to Foot Sleeping Arrangements.

Heating. Proper heating is the process of raising the temperature of cold air within quarters occupied by troops to about 70 to 72 degrees Fahrenheit with a relative humidity of 50 per cent, and then maintaining this temperature and humidity within the zone of comfort. The "zone of comfort" is that range of the combined effect of temperature, humidity, and movement of air within which there is no discomfort due to either warmth or cold. The term "effective temperature" as pertains to heating includes humidity and movement of the air. The optimal effective temperature to provide the average winter comfort zone ranges from 63° F. to 71° F. The average summer comfort zone is somewhat higher, ranging from effective temperatures of 66° F. to 75° F.

Since physical efficiency is decreased by improper temperature, humidity, and movement of air (i.e., improper effective temperature), the air conditions of occupied quarters should be determined and then adjusted, if necessary, to insure maximum comfort. Upon entering a room a person can note at once the state of air conditions of which those who have been in the room for some time may be unaware. If improper a sense of discomfort is noted—stiffness, lack of freshness, excessive warmth. The temperature should be adjusted according to the work performed and the clothing worn by the individuals.

Where soldiers are actively engaged physically, the effective temperature may be lower than where their duties are sedentary.

Light. Light aids health by providing a sense of brightness and cleanliness, stimulating morale, and increasing a desire to maintain hygiene and sanitation. Adequate lighting facilities should always be provided where men read or carry on clerical work. The continued use of poor light will cause impairment of vision. The minimum window (light) space for a squad room should equal about 20 per cent of the floor space, provided there is no obstruction to light entering the building by adjacent buildings or other external objects. Natural illumination is better than artificial light.

Housing sanitation or cleanliness. Improving the environment by the use of control measures to destroy or curb the activities of pathogenic micro-organisms injurious to man is important in preventive medicine. These measures include: cleaning or policing, disinfecting, disinfection, and fumigation.

Cleaning or policing a building signifies the removal by scrubbing and washing, as with hot water, soap, and washing soda, of organic matter upon which and in which bacteria may find favorable conditions for prolonging its life and virulence; also, the removal by the same means of bacteria adherent to surfaces. Painting a surface could be included in this class of cleaning measures. Rooms previously occupied by infected persons should be cleaned prior to admittance of other occupants.

Disinfecting is a process of destroying insects and animals which are known to be capable of conveying infection. The measures of destruction include the use of dry or moist heat, gaseous agents, poisoned food, trapping, and allied measures. "Delousing" refers to the process by which a person and his personal apparel are treated so that neither the adults nor the eggs of *Pediculus corporis* or *Pediculus capitis* survive. Men are required to bathe and shave; wearing apparel is steamed.

Disinfection is the process of destroying the vitality of pathogenic micro-organisms by chemical or physical means. It may be concurrent or terminal to the infection. The use of a disinfectant, such as cresol solution, to scrub a bed which has been occupied by a person with a communicable disease is an example of disinfection.

Fumigation is the process by which the destruction of insects, such as mosquitoes and body lice, and animals, such as rats, is accomplished by the employment of gaseous agents. Hydrocyanic acid gas is the most effective agent of fumigation. Other agents quite commonly used are sulphur dioxide, carbon disulphide, and carbon monoxide.

Insect Control. Insect control is essential for the maintenance of health, especially in warm climates. They are factors in the transmission of disease serving either as hosts for certain diseases or as mechanical carriers of disease organisms.

Flies are the most common insects which are known to affect the health of humans. They are filthy in their habits and spread disease by transferring germs on their appendages or in their excretions from one place or person to another. In this way the house fly is capable of transmitting any of the pathogenic bacteria. The most common bacteria it transmits are the intestinal disease producers. The transmission of protozoal infestations *endameba histolytica* and *ascaris lumbricoides* may also be attributed to flies. Flies breed in and live on putrescent material of any kind—garbage, feces, manure, and other wastes. Fly control is best accomplished by the elimination of their breeding places. Adult flies are destroyed by fly traps, swatters, poisons, fly paper, and fly sprays. A fly is attracted by food and it is by means of contaminating food that most of the diseases carried by flies are transmitted to man. Therefore protection of food from contact with flies is important. Screening of windows and doors is necessary for both mess halls and barracks. The control of flies with respect to messing and field sanitation is discussed in Chapter III.

Mosquitoes spread certain communicable disease by furnishing a biological link between the person sick with the disease and a well person. Like flies, they are best eliminated by destroying their breeding places and habitations. As they must have water in which to breed, drainage of standing water, or oiling water that cannot be drained, destroys their breeding places. The elimination of tall grass and underbrush destroys their habita-

tions. Screening of sleeping quarters and the use of mosquito bars (bed nets) should be enforced.

Diseases transmitted by mosquitoes are:

Dengue (*Aedes aegypti* and *Aedes albopictus*).

Filariasis due to *Wuchereria bancrofti* (*Culex fatigans* and *Aedes variegatus*).

Malaria (*Anopheles*).

Yellow fever (*Aedes aegypti*).

The Medical Department is responsible for mosquito investigation, reporting of conditions which require mosquito control, and for recommendation of control measures. The Quartermaster Corps is responsible for materials, construction, equipment, and labor, including the operation and maintenance of control measures. The Medical Department may act in an advisory capacity for technical procedures.

Bedbugs are occasionally found in the sleeping quarters of soldiers. They are usually introduced by individuals whose recent environment was not of the best. Once established they are very difficult to eliminate completely. They are obnoxious and are strongly suspected of being agents in the spread of certain communicable diseases such as relapsing fever, leishmaniasis, and tularemia. Control is best accomplished by fumigation with hydrocyanic acid gas which destroys the adult and the eggs. If hydrocyanic acid gas is not available or practicable, sulphur dioxide gas is next best. Liquid insecticides of various kinds are effective against bedbugs if applied thoroughly, forcing the liquid into places in which bedbugs seek protection or lay their eggs. All measures except hydrocyanic acid gas fumigation require repetition every few weeks as some of the eggs will usually escape destruction, hatching out to form a new generation. *Roaches* and *ants* can be destroyed by the same means, however they are usually not numerous if food is placed beyond their reach. Sodium fluoride powder, borax powder and arsenic, and liquid insecticides are effective.

Lice have been a problem to the military for hundreds of years. They are known to carry the following diseases from one individual to another:

Relapsing fever

Trench fever

Typhus fever (epidemic)

There are three varieties of lice, the head louse, body louse, and pubic louse. Body and pubic lice are also known as "cooties" and "crabs," respectively. The best protection against lice is cleanliness of person, clothing, and bedding. Individuals who bathe daily and sleep in night clothing need have little fear of louse infestation. Frequent sunning and airing of bedding will usually destroy them. It is no disgrace to get lice; it is a disgrace to keep them. Large organizations of men which become infested with lice are furnished with large steam delousers (portable) through which all clothing is passed in order to kill the lice. The individuals disrobe, bathe, and are furnished new clothing or clothing which has been deloused. This process is known as delousing. Physical examination of troops should include the examination of the hairy portions of the body for lice. If lice and their eggs are found the hair should receive thorough shampooing with hot soapy water containing kerosene. The kerosene must then be washed off with soap and the hair combed with a fine tooth comb. The pubic hairs can be shaved if there is any difficulty in removing all the nits.

Ticks and *mites* are carriers of the following diseases:

Relapsing fever

Tsutsugamushi (Japanese river fever)

Rocky Mountain spotted fever

Tularemia

Prevention of disease from wood ticks and mites is accomplished by careful inspection of the clothing and body after passing through tick or mite infested areas. The eradication of the tick hosts (usually rodents) is a method of tick control. The burning over of underbrush and waste ground helps to keep down the number of wood ticks. This method may be available for the protection of troops.

Fleas are agents of transmitting plague and typhus fever (endemic). They are eliminated by eradication of the animal host which infects them. Fleas will resort to man when the normal host is not available, and, if his former host was infected, the disease will be transmitted to the human host. As man may be closely associated with domestic animals he is apt to be bitten by fleas normally parasitic on such animals. If the fleas are traced

to rats, then effective rat control measures must be employed. Pet animals may be freed by the use of various methods such as powdering with derris root powder, pyrethrum powder, or bathing in a solution of 2 per cent cresol, or kerosene and soapy water. If a building or room is infested with fleas, fumigation with hydrocyanic acid gas or sulphur dioxide is effective. The room should then be swept and the sweepings burned.

Rodent control. Rodent control is important because rodents, especially rats, are hosts for fleas which are capable of transmitting plague and typhus fever. In order to control the disease the original reservoir of infection, the rodent host on which the flea feeds, must be destroyed. Ground squirrels, rabbits, and rats are the most commonly infected rodents. The rodents and the more common diseases with which they may be infected respectively are:

Rats: Bubonic plague, rat-bite fever, typhus fever (endemic).

Ground squirrels, rabbits, woodchucks, muskrats, skunks: Tularemia.

Ground squirrels, chipmunks, meadow mice: Rocky Mountain spotted fever.

Rat control is the most important because rats serve as hosts for the rat flea and are a source of plague and typhus fever (endemic). Plague has a very high mortality, and may be wide-spread among a colony of rats. Because rats tend to inhabit the same buildings as man, the diseases affecting the rat are apt to be transmitted to man. Measures of control are designed to prevent the migration of rats to a community. If they are already present measures are taken to destroy them or force them to leave. All buildings should be rat-proofed; all openings to buildings which permit entrance of rats should be closed; all drains leading from the building should be constructed to prevent the entrance of rats; building material used should be non-destructible by rats. The storage of food and food wastes should be such as to prevent access to them by rats. Food must be stored in metal containers and so placed as to be away from the walls and off the floor; garbage cans should be covered and the garbage should be disposed of promptly so as not to be accessible to rodents. Cement walls and floors and the storing of food products in refrigerators and metal containers has decreased the incidence of rat prevalence.

Fumigation with hydrocyanic acid gas is the most effective means of exterminating rats and in addition destroys the fleas which are using the rats as hosts. Trapping rats has a disadvantage in that the fleas leave a dead rat, migrating to a living host as soon as one is available.

In a suspected plague area control measures should be carefully planned, using the most suitable methods available. The routine autopsy examination of all rats killed should be continued until an infected rat is found. Measures may include the following: reducing the rat food supply to the minimum, rat-proofing, rat poisoning (with rigid supervision), fumigation with hydrocyanic acid gas, and trapping as necessary to secure specimens for examination.

Other rodents are eradicated by destruction of their habitat and by hunting, trapping, or poisoning. When such rodents are used as meat for human consumption (rabbits and squirrels, principally), the meat should be thoroughly cooked. Rubber gloves should be used by persons engaged in dressing these animals or when performing necropsies on infected laboratory animals. Diseases harbored by these rodents are more prevalent in the spring and early summer during the appearance of early ticks.

Measures to Maintain Health and Vitality. Measures designed to maintain the health and vitality of the individual include several factors, some of which are personal and some are environmental. Watchfulness of the general health and strength is the best insurance against sickness. Proper food, proper clothing, activity (work and exercise), and rest and sleep are all important. Personal hygiene is of paramount importance; it is discussed in Chapter V.

Food. Good food, nutritionally adequate, properly prepared and served, is vitally necessary to good health and discipline. Nothing contributes more to the contentment and morale of the soldier than a good mess. Few things contribute more to good health, buoyant vitality, and natural resistance to disease than adequate nutrition.

Clothing. Proper and adequate clothing protects the soldier from undue exposure to adverse climatic conditions, maintaining his general resistance to many diseases, especially the respiratory diseases.

Activity. Work and exercise must be tempered to suit the physical condition of the men and their environment. Activity improves the general health, especially outdoor work and exercise. Even during severe epidemics it is much better to keep the well men busy in the open air. Working or exercising men until they become slightly tired does no harm, but fatigue is to be scrupulously avoided, especially during an epidemic or a threatened epidemic.

Rest. Rest, relaxation, and sleep are next in importance to food in maintaining health. Work periods should be interspersed with short rest periods. In training troops, the type of work should be changed often enough to prevent monotony and provide relaxation. Sleep is a natural process in the maintenance of health, and loss of sleep lowers the vitality. The average person requires 7 to 8 hours of sleep in 24 hours, which should be taken at regular times; however, if needed, sleep at any time is beneficial. Sleep should always be had under the most favorable conditions; in a quiet place, with plenty of fresh, cool air, without drafts; in a comfortable bed with sufficient coverings. Night clothes should be worn whenever possible.

Health warnings. Even though the sick men are not seen by him in person, the organization commander can do much in the prevention and control of communicable disease. The company commander receives definite information every day as to the state of health of his command when he signs the Daily Sick Report. A sick rate of 1 to 2 per cent of the total strength of his command—varying according to the environment and the seasoning of his troops—may be regarded as normal. A sick rate of 3 to 4 per cent should be viewed with alarm and should call for prompt investigation of the general sanitary conditions. A sick rate of 4 to 5 per cent calls for drastic measures, with the closest supervision of environmental conditions. A rate exceeding 5 per cent generally indicates an epidemic of one or more communicable diseases. An unusual number of injuries should cause the company commander as much concern as an excessive number of sick men. The rates mentioned are not the daily admissions to the hospital but are the total number of men absent from duty each day on account of sickness or injury.

Specific Prophylaxis. Specific prophylaxis is limited to a very few diseases. At the present time the most important ones, from the military standpoint, are typhoid fever and smallpox. In the military service protection of the individual against these diseases is a routine matter, required by higher authority. But the commander of a small unit, such as the company, has a very definite responsibility to contribute to this protective procedure by seeing to it that all of his men receive the necessary prophylactic treatment promptly in compliance with these orders. When circumstances require it, such as the prevalence of other communicable diseases for which passive immunity can be obtained by artificial means, the medical officer should make clear to unit commanders the need for specific prophylaxis. The unit commander will rely on his medical officer for information of the presence of such diseases in the command or in adjacent communities. In peace time stations or during campaigns in countries where cholera is prevalent, all troops are required to be vaccinated against this disease.

Isolation and Quarantine. Isolation and quarantine are physical measures taken to separate and segregate contacts and infected individuals from those who are well.

Isolation. By isolation is meant the detection and segregation of a person or persons suffering from a communicable disease, or carriers of the infecting micro-organism, so as to prevent the direct or indirect conveyance of the infectious agent to unexposed, susceptible persons. Isolation is usually maintained in a separate ward of the hospital or in a building separate from other dwellings. The care of the isolated patient should be entrusted only to personnel that is well-trained and experienced in handling such cases and who will also enforce and practice strict personal hygiene.

Quarantine. By quarantine is meant the limitation of the personal association and physical surroundings of persons (or animals) who have been exposed to communicable disease for a period of time equal to the longest usual incubation period of the disease to which they have been exposed.

Working quarantine is the segregation of a group of contacts to prevent the spread of the infection to the unexposed members of the command. This group then continues its

training or duties as a separate unit until the period of quarantine is over. In this manner the occurrence of disease may be restricted to the members of the quarantined group. The quarantined group should be inspected by a medical officer once or twice daily in order to detect any new cases of disease in the early stages. Carriers are removed for individual isolation and treatment in a hospital.

Camp quarantine may be established in camps or mobilization centers where there is a prevalent communicable disease. By this measure the entire camp is placed under restriction, and the units therein are limited to the territory of the camp during the period of quarantine.

A *detention camp* may be established within a mobilization center for the housing of recruits so that disease symptoms may appear, if present, without exposing the entire personnel. If a case develops the period of quarantine is then prolonged until a continuous period passes, equivalent to the incubation period of the disease detected, without the development of any communicable disease within the group.

Early Recognition of Disease. The early recognition of the fact that a man is sick is a very important factor in disease control. No special knowledge of medicine is required to recognize that a man is sick with some acute disease. Company officers are not expected to make diagnoses, but they are expected to recognize that a man is probably sick. The specific diagnosis is for the medical officer to determine. In a great many instances even the most experienced medical officers cannot make a definite diagnosis the first time they see a sick man, especially one in the initial stage of a communicable disease, because many such diseases, initially, present several of the same symptoms. The detection of sickness is not as difficult as commonly believed. Company and platoon commanders make frequent inspections of their men, with special reference to their clothing and equipment. Dirty clothes, an unshaven face, or a dirty rifle will seldom be overlooked. It is an equally simple matter to look at men with attention directed to their physical condition. In a short time the alert officer will do so unconsciously and, as in other inspections, the man who is normal in appearance leaves no lasting impression, but the sick man stands out prominently. Sick men should be immediately removed from intimate contact with well men. Segregation of the sick and early, proper disposition of the sick or disabled men of an organization will save three-fourths of the time they would otherwise spend in hospital. Likewise, early recognition of the sick may prevent many unnecessary contacts and prevent the spread of a communicable disease if the ill person detected has such a disease.

PREVENTION AND CONTROL OF VENEREAL DISEASES

Historical Background. For hundreds of years armies have been decimated, and the civil communities in their theatres of operations have been scourged, by outbreaks of venereal diseases, often of epidemic proportions. Biblical history indicates that Moses recognized and took steps to eliminate the venereal disease hazard. The history of the venereal diseases in the United States Army is graphically represented in Plate 4. With very few exceptions, they have been the outstanding cause of ineffectiveness (loss of time from duty) among our troops. During the World War, although the venereal disease situation was unusually good as compared with that of other wars, the loss of time from duty on account of venereal diseases was exceeded only by that due to an unprecedented outbreak of influenza. During peace time, the venereal diseases ordinarily cause more loss of time from duty than all the other communicable diseases combined, although men with active venereal disease are not accepted for military service. In war time, men with curable venereal disease are accepted, as any other policy would cause the rejection of many serviceable recruits and would also place a premium on the acquisition of venereal disease as a means of avoiding military service.

The Venereal Disease Problem. Control of venereal diseases has been, and still is, one of the most difficult sanitary problems confronting the Army and one of the most serious problems affecting the efficiency of troops. These diseases are prevalent in civil communities, and are brought to military communities by persons in the military service as a result of sexual intercourse. Exposure to infection, and the consequent acquisition of a venereal disease is, therefore, an act on the part of the individual. Few men die from the immediate effects of venereal disease, but many are rendered inefficient and non-effective for long

periods. These diseases may easily render a large part of any command entirely unfit for field service. For the daily average during the year 1918 there were 10,788 men and officers absent from duty on account of venereal disease. Our military authorities have long recognized the gravity of the venereal disease situation. In 1910, the Surgeon General of the Army stated: "The venereal peril has come to outweigh in importance any other sanitary question which now confronts the Army, and neither our national optimism nor the Anglo-Saxon disposition to ignore a subject which is offensive to public prudery can longer excuse a frank and honest confrontation of the problem." Now, more than 31 years after that statement was made, civilian authorities, too, are aroused to the gravity of the venereal situation and are taking steps to combat it.

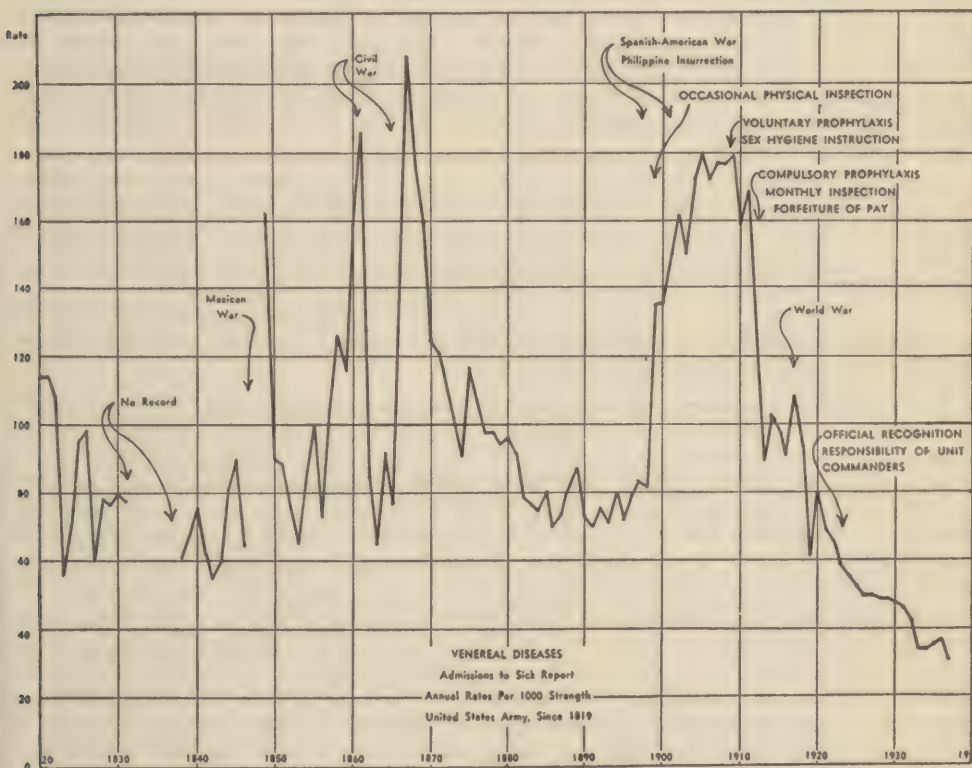


Plate 4. Graph of Venereal Disease Admissions, U. S. Army, 1819-1937.

Responsibility for Venereal Disease Control. Until 1923, the responsibility for the control of venereal diseases was vested almost entirely in the Medical Department of the Army. In that year an Army Regulation was published which for the first time placed the question of instruction and prevention where it belonged—on unit commanders. There is no doubt that a great deal of the credit for the radical reduction in venereal diseases effected, following the publication of those orders in 1923, belongs to the activity of unit commanders in their endeavors to provide healthful sports and decent diversion for their men when off duty. At the present time commanding officers of all grades, from the highest to the lowest, are keenly aware of their responsibilities in this matter. The result of this awareness is graphically shown in Plate 4. While the activities of the company commander in the control of venereal disease in his company are largely of an administrative and disciplinary nature, the company commander is one of the most important factors in the control of those diseases. His attitude toward such control will be reflected by the actions of his men. All company officers should, therefore, be well versed in the nature of the venereal diseases and the means by which they can be controlled.

The Venereal Diseases. The four venereal diseases are: gonorrhea, chancroid, syphilis, and lymphogranuloma inguinale. All are infectious diseases. These diseases are more prevalent among colored persons than among whites.

Gonorrhea is almost invariably transmitted among adults by sexual intercourse. About three days after exposure the victim first notices a burning on urination, followed in 24 to 48 hours by a yellowish discharge from the penis, which may continue for several weeks. In the untreated case, the discharge may continue for several months. At any stage of the case in which gonorrheal germs may be found, the disease can be transmitted during sexual intercourse. Gonorrhea is both a local and a general disease. Its most obvious effects are on the mucous membrane of the urethra. The germs may be carried by the blood stream to the joints where they produce gonorrheal arthritis, a very disabling type of rheumatism, or they may be carried to the heart where they produce gonorrheal heart disease. The germs often get into the testicle, causing a long and painful disability which may result in sterility. The most distressing complication is gonorrhea of the eyes. In this affliction, the germs have almost always been carried to the eyes by fingers soiled with secretions from gonorrhea infected genitals. Most cases of gonorrhea of the eyes result in blindness.

Chancroid, also known as "soft chancre," is transmitted by sexual intercourse. About three days after exposure one or more small sores appear on the penis. These sores grow larger quite rapidly and within two or three days the whole head of the penis may be involved. The lymphatic glands in the groin are usually affected; these swollen, infected glands are "buboes" (commonly called "blue-balls") and almost invariably break down, leaving large, open sores. Chancroid sores and chancroid buboes heal very slowly, the victim being disabled for several weeks or even for months. In about half the cases of chancroid, a syphilitic infection is also present.

Syphilis is most frequently acquired through sexual intercourse. The initial sore, called a "chancre," or "hard chancre," normally appears on the genital organs, usually about the head of the penis. Infection may take place by non-venereal direct contact, such as by kissing a person who has active syphilitic sores in the mouth. The initial sore (chancre) is found at the point of infection, generally about three weeks after exposure. By the time the chancre is of noticeable size the syphilitic infection has been carried by the blood stream to every part of the body. A few weeks later, in the untreated case, syphilitic sores appear in the mouth, a syphilitic rash usually appears on the skin, and buboes may appear in the groins. In a few years the heart and blood vessels will have been seriously damaged, and the brain and nervous system will have been invaded and changed by the syphilitic infection. Untreated cases of syphilis never recover from the disease. Such cases not only never recover but they also transmit the disease to their children, this being one of the very few diseases transmitted from parent to offspring before the birth of the latter. "The sins of the father are visited on the sons, even to the third generation."

Lymphogranuloma inguinale. Lymphogranuloma inguinale is a specific infectious disease transmitted by venereal contact. It may, however, be transmitted in other ways, as the secretions and discharges from the lesions are infective. It is the so called "fourth venereal disease," and since June, 1937 has been reported by the Medical Department as a venereal disease following instructions issued by the War Department to that effect.

The incubation period is from one to seven weeks, the average being about three weeks. The initial lesion is usually on the glans penis or prepuce in the male, it being a papular infiltration which may be accompanied by prostration, headache, and pyrexia. In several weeks, the inguinal glands (most commonly unilateral) become enlarged, painful, and coalesce into a mass with distension of the overlying skin which becomes a dark purplish red. Soon isolated softened areas appear, which rupture, and a sero-purulent fluid (infective) exudes from the multiple sinuses. The intensity of the disease may vary. However, all cases of adenitis become chronic, causing much scarring which may be extensive. The mortality is low, but the morbidity is high and the period of convalescence may be weeks, months, or years in duration.

Diagnosis is confirmed by the use of the *Frei* intra-cutaneous test, which is the injection of the specific antigen intracutaneously in the forearm. In 24 to 48 hours a positive

test will reveal an area of erythema one to several inches about a papule approximately 8 to 10 millimeters in diameter. A negative reaction has a small area of erythema (with a papule less than 7 millimeters in diameter, usually 3 to 5 millimeters). A control injection of an equivalent amount of normal saline solution may be used. The test will be positive in the early stage of adenitis.

This disease is prevalent in the tropics, especially among the prostitutes. It is comparatively rare within the United States. Because of its recognition and positive differentiation from the so-called non-venereal bubo it is placed under the same measures of control as other venereal diseases. An attack of the disease does not confer immunity, and the susceptibility is universal. There is no specific cure, the best recommended procedure being the surgical removal of the involved glands before suppuration. When secondary infections occur they are treated locally, with similar general measures as for other infectious diseases.

Treatment of the Venereal Diseases. The venereal diseases can be cured if the victim will present himself promptly to a reliable doctor for treatment. Self treatment, or something obtained from and upon the advice of the clerk in the drug store, will likely be entirely ineffective. Quack doctors are not so much interested in effecting a cure in such cases as in prolonging the treatment for their own financial benefit.

Communicability. The venereal diseases are communicable; every case comes from some other case. They are transmitted by direct contact. To prevent their spread the chain—source of infection, susceptible material, and contact between them—must be broken. A previous attack does not confer immunity, and there is as yet no specific immunizing agent such as we have in typhoid fever or smallpox.

Sources of Venereal Disease. The primary, or direct, source of venereal disease is usually the infected woman who practices illicit sexual intercourse. In the majority, such women are prostitutes. It is extremely rare that these diseases are innocently transmitted from soldier to soldier. The secondary, or indirect, source of venereal disease is the infected male population, civil and military.

General Prevalence of Venereal Disease. The prevalence of venereal disease in the civil population of the United States cannot be accurately determined. Studies show that more than 75 per cent of all prostitutes are infected; the chances that a prostitute will escape all venereal infection are remote, although she may not be capable of transmitting the infection at all times. Information obtained during the World War showed that 5.6 per cent of the men who presented themselves for military service were the victims of active venereal disease. It is estimated that at least 10 per cent of all civilian males are the victims of active venereal disease at any given time.

Obstacles to the Control of Venereal Disease in the Army. The spread of venereal disease among troops is influenced by a number of factors that do not obtain in other communicable diseases. The primary source of infection, that is, the infected woman, and the major portion of the secondary source of infection, the infected male, are beyond direct control by military agencies. It is therefore evident that the fullest cooperation of the civil authorities must be obtained in order to make any material reduction in the basic sources of these diseases.

General Control. Fundamentally, measures for the control of venereal diseases are designed either to prevent exposure to venereal infection or to prevent the development of the infection in the exposed individual. Prevention of exposure consists of control of prostitution, educational measures, recreational measures, and deterrent laws and regulations, and the abatement of active cases among military personnel. Prevention of development of infection in the exposed individual consists of chemical prophylactic treatment, the effectiveness of which is dependent on the training and discipline of the command.

Control of Prostitution. Control of prostitution is accomplished by two generally recognized methods—regulation and suppression. Regulation does not actually regulate but serves to promote rather than to limit the spread of venereal disease. Regulation is no longer countenanced anywhere in the United States as a legitimate means of controlling prostitution. Control by suppression does not eliminate the prostitute, as prostitutes are always present in any civilian community of any considerable size. It does, however, greatly

reduce exposure to venereal disease by the elimination of open houses of prostitution, and it restricts the activities of the prostitute by rendering the practice of prostitution more difficult and the prostitute less accessible. Suppression of prostitution is a police function of the civil authorities. The laws which make prostitution illegal also facilitate the enforcement of measures for the direct control of venereal disease by civilian health authorities. In controlling sources of venereal disease in civilian communities adjacent to military communities, the military authorities can influence and promote that control through cooperation with civilian authorities in ways which vary with and depend upon the local economic and political situations. Such influence is usually exerted by the higher military commanders, but company officers frequently have opportunities to lend their support to such movements. During the World War the welfare organizations and the public health bodies throughout the country united in their efforts with those of the Medical Department of the Army to help prevent these diseases among the men in the army while serving in this country and in France. Saloons were closed to soldiers, and no vice resorts were allowed in the vicinity of military camps.

Military Control by Prevention of Exposure. *Education.* Educational measures are for the primary purpose of reducing the number of exposures to venereal infection by providing the individual with accurate information regarding the spread of venereal diseases, their effects on the human body, and the methods of prophylaxis. Most of this instruction should be given by medical officers and by company commanders of the troops concerned. (See AR 40-235.) Standing orders require that every soldier, upon enlistment or reenlistment, be given instruction every 6 months in "sex morality" or "sex hygiene." This instruction is usually divided into three parts: the moral aspects, the medical aspects, and the administrative aspects. These different subjects are usually presented to the men by a chaplain, a medical officer, and a company commander, respectively. This instruction should be comparatively brief, sincere, and in simple terms. The efficient and alert company commander will not be satisfied with perfunctory instruction of his men but will seize opportunities to simply, clearly, and briefly drive home the essential points. Troops are best instructed by their immediate officers; a soldier will take an interest in the instructions of his company officers but will resent "preaching" from other sources. The instruction which troops receive should include: (1) Information concerning the local environment; the prevalence and danger of venereal disease in the adjacent civil community. (2) The danger from venereal disease to themselves and their associates, and to their wives and children. (3) The standing orders requiring prophylaxis after exposure. (4) The use and abuse of prophylaxis. (5) Punishment they may expect for failing to report the contraction of a venereal disease. (6) The fact that continence does not weaken them physically or sexually. (7) Their duty to the government and to themselves.

Recreation. Recreational facilities for soldiers are extremely important. Well equipped day rooms, reading rooms, service clubs, and gymnasiums; athletic contests, motion picture shows, band concerts, dances, or any other activities which provide wholesome interest for troops and serve to keep the soldier in the military community, reduce the number and length of periods during which he must find or provide his own entertainment, thereby reducing the opportunities for and number of exposures to venereal infection.

Abatement of sources of venereal disease. In military communities, since part of the indirect source of infection is the soldier with venereal disease, every effort is made to decrease the sources of infection by the prompt detection of cases of those diseases among the personnel, placing them in quarantine and effecting their cure. To this end, standing orders require that troops will be inspected at least once each month for physical defects of all kinds, including venereal disease. These inspections are made by a medical officer, who should always be accompanied by a company officer of the unit concerned.

Chemical prophylaxis. Realizing that in spite of all the efforts to prevent it some men will expose themselves to venereal infection, the army furnishes "prophylactic treatment" for the prevention of the development of the venereal diseases. This prophylaxis is accomplished by the use of chemicals that destroy the various germs that cause the venereal diseases and do not harm the person treated. The treatment must be used

after *each exposure* to these infections. It should be noted that this type of prophylaxis is quite different from the immunizing treatments mentioned in connection with certain other communicable diseases. The venereal prophylactic treatment properly administered within an hour after actual exposure is 90 per cent (or more) effective in preventing the development of venereal diseases. If the treatment is delayed for 5 or 6 hours after exposure the protection is only about 50 per cent effective. The prophylactic facilities are furnished and operated by the Medical Department.

There are several individual *prophylactic tubes* manufactured commercially. Some one of these will be stocked by post exchanges. They are not as efficient as the treatment given in prophylactic stations but are of great value for soldiers who are unable to get to a station within an hour after exposure. Even after using one of these tubes, a soldier should report to a prophylactic station if possible.

Cleanliness. If a soldier has exposed himself and has neither a prophylactic tube nor access to a station, he should empty his bladder, and then scrub his genitals and the surrounding skin areas with soap and water. This may serve to prevent infection.

Punitive measures. (1) Any individual who knows or believes that he has contracted a venereal disease must report that fact to his immediate commanding officer without delay. Trial by court martial or other disciplinary action is discretionary with the commanding officer. No disciplinary action is authorized for failure to take prophylaxis or for having contracted a venereal disease.

(2) Any person in the military service who loses time from duty because of a venereal disease forfeits his pay during the time so lost and must make good the time lost.

Physical inspections. The periodical physical inspections which are conducted at least once each month for all enlisted men below the first three grades include inspection for evidence of venereal disease. Additional inspections may be arranged if it is believed that some men may be concealing venereal disease. These are most effective if conducted early in the morning or just after return from outdoor activity.

Treatment. All cases of venereal disease should be promptly sent to the hospital or dispensary for treatment. Early treatment offers far better chances of cure than does delayed treatment. Self-treatment or treatment by unskilled individuals are both ineffective and dangerous.

Action to reduce high venereal rate. In case a command has an excessively high venereal rate at any time, stringent control measures may be necessary. These may include all or part of the following:

Placing houses of prostitution and all places selling liquor, out of bounds.

Patrolling of restricted districts by military police.

Limiting all passes to 4 hours and granting no passes after 9 P. M.

Classifying passes.

Routine bed check.

Army Regulations on Control of Venereal Diseases. Army Regulations 40-235, paragraphs 1 to 7 inclusive, are herewith included to furnish information about the preventive measures against the venereal diseases and the manner of putting them into effect. They will also assist the reader in maintaining and completing the required records and returns pertaining to venereal diseases.

1. Education in sex hygiene. *a. Responsibility of commanding officer.* Commanding officers of all grades are responsible for promoting education in sex hygiene among military personnel.

b. Instruction of officers. In all troop schools conducted under the provisions of AR 350-2600, and at the Air Corps Training Center for student officers and flying cadets, a course of instruction of sex hygiene will be given, commencing with the school year 1939-40. In such courses there will be stressed the duties and responsibilities of unit commanders in the prevention and control of venereal disease among the members of the unit, and the best methods of accomplishing this prevention and control.

c. Instruction of enlisted men. At least twice each calendar year and at intervals of approximately 6 months, the commanding officer of each basic unit and detachment will arrange and personally supervise suitable instruction in sex hygiene and the prevention and control of venereal disease for all enlisted men of his command. These instructional periods will be conducted informally; questions and discussions by the enlisted men will be encouraged. A medical officer designated by the post commander will discuss the nature and gravity of venereal diseases, their effect on mental and physical fitness, the importance of early discovery and treatment, and the means of avoiding them. The unit or detachment

commander will present the broader social aspects of the problem and will call attention to the harmful influence of such diseases on military efficiency through the absence of men undergoing treatment. A chaplain will discuss the moral aspects.

d. Instruction of recruits. The instruction prescribed in *c* above will be given to all recruits as soon as practicable after enlistment.

2. **Physical inspections.** In the physical examinations of military commands prescribed in AR 615-250, special attention will be directed to the detection of venereal diseases.

3. **Prophylaxis.** *a. Prophylactic stations.*

(1) *Establishment.* Commanding officers will require that a sufficient number of prophylactic stations be established at suitable locations in each military command. When facilities permit, and necessity therefor exists, such stations will also be established in adjacent civilian communities. Prophylactic stations will be conducted under the supervision of the surgeon, and will be administered by selected and reliable enlisted men who have received thorough training in their duties.

(2) *Records.* A record on W. D., M. D. Form No. 77 (Venereal Prophylaxis Slip) will be kept of each prophylactic treatment, the data entered on the card to include the name, grade, and organization of the enlisted man, the date and hour of intercourse, the date and hour of treatment, the presence or absence of evidence of venereal disease, the name of the attendant administering prophylaxis, and any other information which may be deemed advisable. The records will be authenticated daily by the initials of the officer in charge of the prophylactic station. A certificate signed by the attendant in charge of the prophylactic station, will be furnished each individual receiving prophylactic treatment, showing his name, grade, organization, date, place, and hour of treatment. Records on W. D., M. D. Form No. 77 may be destroyed after a period of 3 months.

b. Prophylactic materials for individual use. Post exchanges will have available for sale at as low a price as practicable suitable materials for individual prophylaxis for venereal disease. The composition and quality of these materials will be prescribed by the commanding officer upon the recommendation of the surgeon.

c. Responsibility of individual. Any individual who exposes himself to venereal infection will employ individual prophylactic materials as a measure of protection against infection and in addition, whenever practicable to do so, will report at once to the nearest military prophylactic station for such cleansing and prophylaxis as may be prescribed by the War Department.

4. **Forfeiture of pay.** Forfeiture of pay by persons in the military service of the United States who are absent from duty on account of the direct effects of a venereal disease due to misconduct is provided for in act May 17, 1926 (44 Stat. 557); 10 U. S. C. 847b; M. L., 1929, section 1442. For details regarding the administration of the act, see AR 35-1440, 40-1030, and 345-415.

5. **Disciplinary action.** Persons in the military service will not be subjected to trial by court martial or other disciplinary action upon charges of having failed to take prophylactic treatment after illicit sexual intercourse, or having contracted venereal disease, or of having thus incapacitated themselves for duty. Any individual who knows that he has contracted, or has reason to believe that he may have contracted a venereal disease, will report the fact to his immediate commanding officer without unnecessary delay in order that proper medical treatment may be given. Trial by court-martial or other disciplinary action for failure so to report is discretionary with the commanding officer.

6. **Reports and records required.** *a. Special reports.*

(1) On each Saturday morning the surgeon will render an informal report in writing to the commanding officer of the station stating the number of individuals among the members of the different organizations of the command who have developed venereal disease during the week ending at midnight Friday. These data will be reported for each company serving at the station.

(2) The surgeon will render to the commanding officer of the station a monthly venereal disease report comparison of the current prevalence of venereal disease with that prevailing during the previous monthly periods in the corps area, or expeditionary force, and in the Army as a whole, together with pertinent information relating to control measures of proved value.

7. **Segregation and treatment.** Every case of venereal disease will be promptly subjected to treatment, but not necessarily excused from duty unless, in the opinion of the surgeon, it is considered desirable. A list of those treated but not excused from duty will be kept both by the organization commander concerned and by the surgeon, and such individuals will be required to report to a medical officer for systematic treatment until cured or discharged from the service. Individuals in the infectious stages of venereal diseases will be hospitalized, held in working quarantine, or restricted to the limits of the station, as may be recommended by the surgeon.

CHAPTER V

MILITARY HYGIENE

Definition. Military hygiene is the science of preserving and promoting the health of military personnel. It is the system of securing and maintaining proper personal hygiene by individual members of a military organization.

Personal Hygiene. Personal hygiene refers to those measures or precautions which every person should observe for the purpose of maintaining his own health and physical well-being. It requires the application of a few common-sense rules, the observance of wholesome habits, and the avoidance of excesses of all kinds. It is a phase of the larger subject of Hygiene which deals with the principles and laws of health. These principles and laws are basic and made by Nature. Accordingly, they never change. Community cleanliness is merely the result obtained within a compact group in which all members obey the principles of personal hygiene. An important by-product is the prevention of the spread of communicable disease. Therefore, the application by each individual of health-saving, personal hygienic measures is the cornerstone of the maintenance of group health and of the field of preventive medicine. Personal hygiene is the basis of military hygiene.

Responsibility for Applying Hygienic Measures. Personal hygiene is an essential part of the daily life of the soldier. He is a part of a large and compact unit of men. The health of the man who sleeps or walks beside him may be affected by his neglect or carelessness. The function of the Army in war is to win battles, and they may be won only by strong, healthy, vigorous men. Constant observance of the laws of good health becomes an important responsibility for all Army units and for the individuals who constitute them.

It is Army custom that the individual soldier is held rigorously responsible for the hygienic care of his own person, for his personal equipment, and the area which he occupies. As he must live in a clean, wholesome environment, because decency, self-respect, and efficiency cannot exist in the midst of unclean surroundings, such practices must be followed uniformly by all members of the unit. The leaders of military units, from the smallest to the largest, are held responsible that this condition is attained. The squad leader is responsible that all members of his squad adhere to the principles, the platoon leader for his platoon, the company commander for his company, and the practice continues throughout all echelons of command. Thus, the Army system is based upon individual observance of the laws of personal hygiene; but, as in all other matters, the leaders of units are required to insure obedience within the group for which they are responsible. This system establishes military hygiene.

Responsibility of the Medical Officer. The medical officer is not responsible for enforcement of this system for that duty falls upon organization commanders. But he has very important duties in connection therewith. Above all others he is expert in his knowledge of hygienic requirements. He is a staff officer and adviser to his commanding officer in all medical and health measures. His status presents a duty and opportunity to exert an important influence over the health measures in use by the officers and men of the organization. By inspection he can determine the hygienic laws which are being violated. By instruction he will be able to improve the knowledge and understanding of the officers and men of the unit of which he is a part. In this way the medical officer may exert a profound influence in the improvement of hygienic conditions affecting the lives and physical welfare of the men of the command whose illnesses will otherwise reach him for treatment and cure.

NUTRITION

Importance. The appetite has been man's chief guide to his dietary requirements and remains one of our most dependable indicators. While it is unsafe to depend on its guidance alone it is, nevertheless, a more reliable guide than speculation or too narrow scientific dogmatism. We know that when appetite is lost it is a warning of mental or physical disorder. Certain conditions other than disease influence digestion. The earliest indications of mental or physical irregularity may be manifested by the loss of appetite, combined with disorder of the alimentary tract. This is evidenced most sharply in children who seem to be safeguarded by nature from the excessive use of food.

It is well known that emotional states and the condition of the mind affect nutrition. Disturbances of the nervous system such as worry, remorse, jealousy, heavy responsibility and the like, adversely affect nutrition and should be avoided.

Eye strain is another deleterious factor; a capricious and faulty appetite often arises from this cause. Ocular defects and refractive errors should be corrected.

Improper posture and improperly fitting clothes (trouser belt or field equipment belt) affect the blood circulation in the liver and abdominal organs, consequently impairing digestion and nutrition.

Eating immediately before or after bathing or exercise is not a healthful practice. The digestive organs are depressed temporarily as a result of bathing and physical exertion.

Dietary Requirements. The requirements for a healthy adult with regard to the various food components are as follows:

FOOD REQUIREMENTS FOR AN ADULT (IN GRAMS).

	<i>At heavy labor</i>	<i>At rest</i>
Proteins (roughly flesh)	180-210 grms.	75 grms.
Fats	105-135 grms.	30 grms.
Carbohydrates (starches and sugars)	480-540 grms.	360 grms.
Salts	30- 45 grms.	15 grms.

In calories the fuel requirements for the body are as shown in the table:

CALORIES REQUIRED BY A MARCHING SOLDIER.

<i>Load</i>	<i>Road</i>	<i>Normal needs</i>	<i>Extra work</i>	<i>Total</i>	<i>10% for waste</i>
0	Level or undulating	2064	900	2964	3260
50 lb.	do.	2064	1172	3236	3560
50 lb.	Ascending 100 feet per mile	2064	2110	4174	4590

Vitamins. The vitamins are soluble bodies of indeterminate nature existing in minute amounts in natural food. They are necessary constituents of the diet. The Army ration has been developed with full consideration of this knowledge. The lack of vitamins may be manifested by a deficiency disease even though an ample amount of food is ingested and in spite of an apparently perfect digestive process.

There are five commonly recognized vitamins: A, B, C, D, and E. These vitamins, and the nutritional diseases, avitaminosis, caused by their lack, are each described below:

Vitamin A (fat soluble).

Found in milk, animal fat, vegetable fat (particularly liver oils), green vegetables, carrots, corn, sweet potatoes, apricots, yeast, and egg yolk.

Lack of this vitamin causes reduction in activity and coordination of movement, xerophthalmia, susceptibility to infection, and lack of growth.

Vitamin B (water soluble). This vitamin may be divided into two factors, B_1 and B_2 , both of which are concerned with growth. They are also known as F and G, or as B and G.

B_1 factor (water soluble).

Found in most foods but largely in the outer layer of grains; therefore a deficiency occurs in such articles as polished rice or white bread.

Lack of this vitamin factor produces anorexia and polyneuritis (beriberi).

B_2 factor (water soluble).

Found in large amounts in beef liver and yeast.

Lack of this vitamin factor causes digestive disturbances, constipation, sterility, nervous disorders, mental depreciation, beriberi and pellagra.

Vitamin C (water soluble).

Found in oranges, lemons, tomatoes, and milk in predominance. Also found in many other foodstuffs which have not been subjected to high temperature in cooking.

Lack of this vitamin causes scurvy. This was formerly a common disease of soldiers and sailors who were unable to obtain fresh foods on their long campaigns and voyages, a condition now rectified by refrigeration. The most frequent sufferers

from scurvy at present are victims of economic conditions or participants in food fads, whereby a balanced diet is not ingested.

Vitamin D (fat soluble).

Found especially in cod liver oil and to a lesser extent in all irradiated foodstuffs such as tomatoes, oranges, milk, and meat proteins.

Lack of this vitamin causes rickets in children and the identical disease later in life known as osteomalacia.

Vitamin E (fat soluble).

Found in animal tissue chiefly in fat and muscle, wheat germ oil, eggs, lettuce, legumes, leafy vegetables, and milk.

Lack of this vitamin causes reproductive disorders, especially in the female during pregnancy. No claim has been made for any failure of fertility due to its absence. Further studies as to the clinical application of Vitamin E are in numerous processes of experiment by researchers in nutritional diseases.

Diets which include a mixture of the following foods will contain enough vitamins to satisfy the requirements of the body: milk, butter, eggs, spinach, whole grains of any kind, dried beans, tomatoes, raw cabbage, citrus fruits, lettuce, raspberries, liver, fish, and meats. Vitamin C may be destroyed by cooking, others to a slight degree only. Vitamins are not lost by foods during storage.

Adequate Diet. Food should be agreeable to the taste and appetite and should be well and tastily cooked. A proper menu should include an abundance of green vegetables in order to supply the necessary vitamins as well as acids, salts, and extractive matters. They also add bulk to the intestinal contents by virtue of their contained cellulose and therefore serve as important stimulants to intestinal contractions and promote normal bowel action and excretion. Fruits also are an important dietary article for they not only add bulk to the diet but also have an advantage on account of their organic acids. These acids aid in preserving the acid-base equilibrium in the body tissues. That is, they help to preserve the neutrality of the blood and tissues.

Sugar and starches supply the main fuel for the combustion in the body. Sugar is a necessary part of the diet but when taken early in the meal lessens the appetite and embarrasses the digestion.

Fats and oils in moderate amount are a necessary part of any diet and are required even in warm climates. Emulsified fats may be absorbed by the intestinal tract without digestion, hence are easily assimilated.

Salts of sodium, potassium, calcium, magnesium, and ammonium are essential to the human body and must be supplied. The lack of ordinary table salt in the diet is soon felt and the craving for it becomes almost unbearable when it is denied. Animals will travel for miles and risk their lives to visit salt licks, and among savages and inland peoples salt is a highly prized commodity. Salt is necessary in cellular nutrition and in the production of gastric juice.

Water forms the bulk of the human body and requires constant replenishment. Most people drink too little water. Water may be taken with meals but food should not be washed down by draughts of water since this inhibits starch digestion and enables the individual to swallow morsels of food too large for the stomach to manage comfortably.

Condiments add taste to the food but used in excess are harmful. Other stimulants should, for the most part, be avoided. Coffee, tea, and cocoa in moderation are acceptable dietary additions.

Constipation. Constipation arises usually from a diet that is deficient in bulk, from a sedentary mode of life, from improper carriage and body tone, and from neglect to respond to the impulse to evacuate the bowel. The remedy lies in the correction of these defects and the cultivation of regularity in habits.

The deleterious effects of constipation are well known. If chronic constipation exists the advice of a medical officer should be obtained in order to avoid dangerous complications. If definite pain is noted in the abdomen, the use of a cathartic should be avoided until and if administered by the physician. When the services of a medical officer are not available,

a plain luke-warm water enema given slowly may be used without much danger to obtain temporary relief.

Rules for Regulation and Control of the Diet, and matters pertaining thereto, are summarized as follows:

Keep the mouth clean and healthy to avoid spread therefrom to the alimentary tract. Visit the dentist periodically to avoid the possibility of any dental defect and to insure complete cleanliness.

Correct any body defects that affect nutrition, such as emotional conditions, eye defects, and errors of posture.

Avoid eating immediately before or after hearty exercise or after bathing.

Satisfy dietary requirements as to proteins, fats, carbohydrates, salts, water, and vitamins. **Have the calory (fuel) intake adequate to the needs.**

Have enough bulk in the diet and secure a daily bowel movement by hygienic living and regularity in habits.

Be careful of uncooked and unsanitary foods. They may contain disease germs.

Eat food regularly and in moderation, eating it slowly and masticating it thoroughly. **Most people eat too much.**

Food should be kept from flies and insects that may carry disease. Mess kits and dishes should be washed in boiling water to cleanse them and to kill any disease germs. Cooks and mess attendants should observe scrupulous cleanliness in all these respects in their persons.

Food that seems stale or spoiled should not be eaten.

Do not eat in dirty lunch rooms and restaurants.

An abundance of water should be taken, but too large an amount should not be taken when overheated. An adult should consume at least eight glassfuls daily. There is little danger of taking too much. Remember that water forms fully two-thirds of the body weight or about ten gallons in an average individual.

Be careful not to drink unclean water which might contain disease germs.

Do not drink cold water rapidly when overheated or drink anything excessively hot at any time.

Coffee, tea, and cocoa in moderation are not harmful and in many instances prove very beneficial. **Intoxicating liquors are harmful.**

Drink from your own glass and eat from clean dishes. Do not exchange pipes, cigars, musical instruments played by the mouth, and gas masks with others.

Do not be careless in the disposal of the excretions of the body. These create a nuisance, serve as a breeding place for flies, and may spread disease.

If there is any question about your physical health or any matter about personal hygiene, consult a medical officer who will assist you and nature in maintaining the health that is your birthright.

DENTAL HYGIENE

Care of the Mouth. Physicians have identified well over 100 forms of micro-organisms in the mouth. The presence of a warm, moist environment, with fragments of food lodged between the teeth to serve as a nutrient material, creates an ideal condition for their development. It is important to the soldier that adequate attention be given to the care of the mouth, including the teeth and the gums.

The teeth are very important in the maintenance of adequate nutrition, and, in turn, adequate nutrition is very important to the teeth. The teeth should be well brushed and the mouth rinsed at least twice each day, especially on retiring for the night. Brushing teeth should be performed with a rotary motion in order to free all foreign material adhering to the gum surfaces and to exercise the gums. If a tooth brush is not available the gums and teeth should be rubbed with the finger, using the same rotary motion suggested for the tooth brush. Dental floss or tape should be used to remove foreign matter lodged between the teeth. The tooth brush should be dried thoroughly between brushings. A frequent change of tooth brush is necessary to insure effective brushing and cleanliness. If a mirror is available, the individual should use the same care in brushing his teeth as in shaving,

making certain that all surfaces are covered. Certain tartar deposits will not come off by brushing and must be removed by a dentist.

Nutritional deficiencies manifest themselves by a diseased condition of the teeth, gums, and mouth. The soldier will have little opportunity for control of this matter as he is dependent upon the ration furnished by the government. Alert to the dangers, however, the medical officer in his inspections should determine whether it is a local or general condition, taking adequate steps to have the soldier visit the dentist or to admit him to the hospital if the condition warrants it. If the diet is inadequate or faulty, the medical officer should make suitable recommendations to the responsible commander of the soldier's unit.

The medical officer, as well as the dental officer, must be watchful for diseases of the gums. The soldier who fails to practice dental hygiene is particularly susceptible to infections of the gums and carious (decayed) teeth.

Pyorrhea alveolaris, commonly called pyorrhea or dental abscess, is the most frequent manifestation of dental sepsis. There are many theories as to the etiology, but all seem to agree that the disease starts as a disease of the gums or gingivitis. It may progress to the extent that the individual involved suffers from general debility, anemia, and loss of weight and strength, depending upon the resistance and tolerance of the patient to the infection. In the early stages pus forms along the margins of the gums and later there are deeper seated dental abscesses. Dental hygiene is specific prophylaxis.

Vincent's Angina, a highly contagious disease commonly known as trench mouth, may sweep through a command through the medium of inadequate mess kit sterilizing facilities. It is most frequently encountered in the individual who does not practice hygienic principles. It may have an insidious onset, since the organisms causing this disease are so frequently found in presumably healthy mouths. Although the disease is not seriously disabling in most cases, the lesions are sufficiently serious to demand every effort to prevent them. Because of its contagion, medical and dental officers must be alert to detect early cases and check sterilization of individual eating utensils in fact as well as in theory.

CARE OF THE SKIN

The hygiene of the skin is necessary for the normal function of its heat regulating and excretory mechanisms. Personal cleanliness is the most desirable of good habits and the mark of a superior person. The man who is attentive to cleanliness of his body, his clothing, his environment, and his food and drink takes the best insurance against sickness. Special attention is necessary for those parts of the body which are exposed to dirt and where perspiration occurs most freely. Routine bathing should include hygiene of the mouth and teeth. A clean body should be clothed in clean garments; clean underwear should follow every bath. Sleeping in underwear should be avoided when it is possible to wear night clothes. Cleanliness is chiefly a matter of habit. The person who really wishes to be clean will find a way to accomplish his desire even under the most discouraging circumstances.

Bathing is beneficial, not only on account of cleanliness but also for its physical stimulation. Neglect of bathing causes obnoxious body odors, promotes the development of skin diseases, and increases the chance of lice infestation. At least two baths a week should be taken; a daily bath is preferable and is definitely necessary in the warmer climates. During the bath special attention should be given the armpits, genitals, crotch, and feet. Shower baths are more sanitary than tub baths; tepid water is preferable to a cold bath. A daily cold bath is a fine tonic.

The cold bath (below 65 degrees Fahrenheit) acts as a stimulant. The proper time to take such a bath is before (but not immediately before) breakfast. The first reaction is to contract the extraneous vessels. Respirations are increased in depth and frequency, the pulse is slowed, and the nervous system stimulated.

Warm baths (90 to 98 degrees Fahrenheit) have the opposite action from cold baths. The skin vessels are dilated, perspiration is induced, pulse and respirations are increased in frequency, and the body temperature is raised. Such baths are very soothing and sedative. They remove muscular soreness and are most agreeable after severe physical exercise. Warm baths also help to induce sleep.

Hot baths (above 98 degrees Fahrenheit) should not be taken except on medical advice. If taken over too long a period they are very depressing and in some instances may produce unexpected complications.

Cleansing baths require the use of soap to remove the dirt, grease, or secretions of the body. Medicated and scented soaps are of little value. Practically all good grades of soap on the market have equal value. In order to get good results ample soaping must be used in a warm bath, and the soap then thoroughly rinsed away.

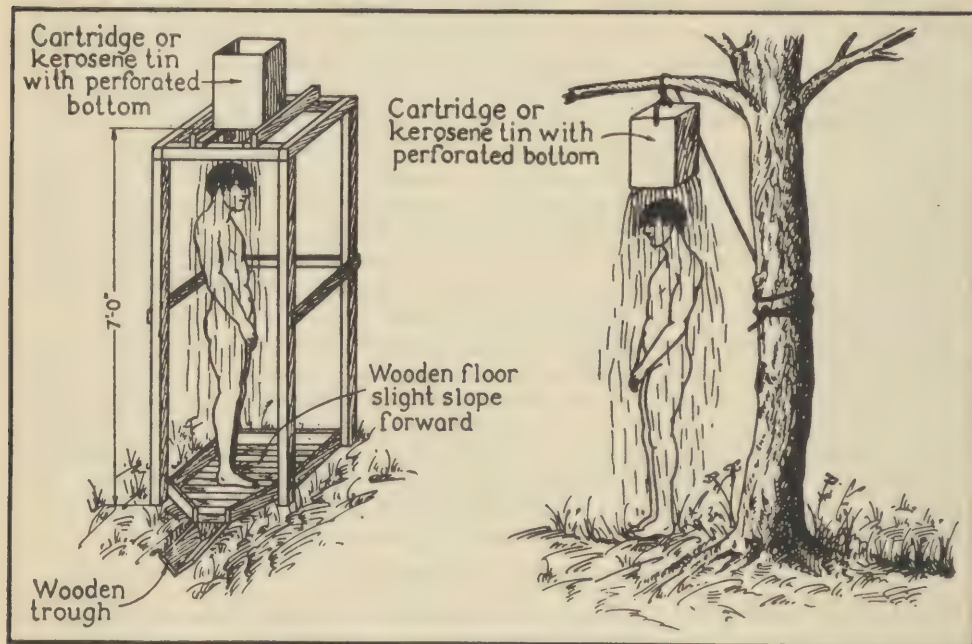


Plate 1. Improvised Shower Bath.

Shaving one's self is much safer than patronizing the average barber. The practice of using the same accessories on several people is dangerous because sterilization may be lacking or inadequate.



Plate 2. Toe Nails Properly Trimmed.

Washing the hands is a "must" before eating meals and after visiting the latrine. Cooks and mess attendants (food handlers) must constantly be aware of this requirement and observe it invariably. Clean, individual towels should be used wherever practicable. A piece of clean paper is better than a dirty towel. If neither is available the hands should be rinsed in clear water, then dried by evaporation.

Care of the Hair. The hair should be cut short and kept neatly combed. The head should be brushed night and morning until there is a feeling of warmth in the scalp.

Brushes should be kept clean. Frequent shampooing to remove dandruff and dirt should be practiced. Head gear should not be so tight as to impede the circulation of the scalp.

Care of the Nails. The nails should be kept cut short and clean. The nails of the toes should be cut straight across as shown in Plate 2. This important precaution, if observed, will avoid most of the trouble from ingrown toe nails. The cuticle of the nails should be pressed back at least once a week, thereby preventing hangnails which are the source of serious infections. If the skin is dry, any good skin cream or hand lotion rubbed into the cuticle will keep it soft and prevent chapping and breaking. A nail brush should be used to clean the fingernails, followed by the use of a blunt instrument to remove any material which is lodged under the tips of the nails.

Clothing. Clothing that is loosely woven and is capable of holding considerable air in its meshes is a poor conductor of heat and consequently feels warm. For this reason wool is especially valuable for clothing. Another advantage of wool is its capacity for absorbing moisture without feeling wet. Evaporation proceeds slowly from woolen clothing, and as a consequence chilling of the body is prevented. Flannel underclothing for this reason is the most valuable in changeable climates. Some individuals find it necessary to wear such underclothing even in the tropics to prevent undue evaporation after excessive perspiration. In cold weather one should dress properly so as to conserve the body heat.

The color of clothing is important. Dark cloth absorbs heat, and white reflects it. For this reason light colored clothing is used in the tropics. Cheap aniline dyes in the cloth may produce skin irritation.

Underclothing should be washed frequently and be well dried. Damp garments afford excellent soil for the growth of micro-organisms.

Clothing should not be allowed to restrict the circulation. For this reason collars, belts, garters, and leggings which fit tightly should be avoided.

Rubber raincoats are useful as a protection against rain and wind. Since they are impermeable to air they are not useful in active occupations and while undergoing exertion. Cloth which is air-permeable but waterproof is better.

Care of the Feet. If the soldier cannot march he is of little value. The condition of the soldiers' feet is most important to the Army. Battles may be won or lost because of the marching ability of the troops.



1. Effect of too short a shoe. 2. Effect of pointed toe shoe. 3. A good foot in a well fitted shoe.

Plate 3. Anatomical Study of Shoe Fitting.

The condition of the feet of the men of an organization is the direct responsibility of its commanding officer, who is required to inspect them frequently. Every effort must be made to prevent and correct foot disabilities. Relatively serious defects usually require medical treatment, and men having such defects are hospitalized and treated. However, the occurrence of many of the disabling minor defects of the feet can be prevented by proper shoe and sock fitting and the care of the feet.



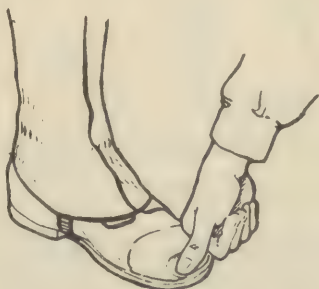
Correct



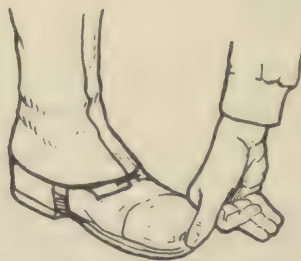
Too wide



Too narrow



Correct



Too short

Plate 4. Shoe Fitting.

The fit of shoes is of the greatest importance. A well-fitting pair should have the inner sides nearly parallel; the outer sides should have a gentle curve inward, and the toes should in no case be pointed. They should be about $\frac{3}{4}$ inch longer than the foot (Plate 3). The leather should be moderately thick and pliable and the heels broad and low.

It must be remembered that marching and field shoes must be fitted with the knowledge that when a pack is carried by the soldier the foot is spread out and enlarged. Marching also causes the foot to swell. Field (service) shoes should therefore be larger than ordinary civilian or garrison shoes. Only the standard Army shoe should be worn by the soldiers, and it must be fitted as described in the following paragraph.

The fitting of each pair of shoes is supervised by a company officer. Each shoe is fitted to the foot of the wearer so that no undue constriction or pressure will occur at any point when the foot is expanded by the superimposed weight of the body and pack. Shoes are also fitted so that at no point is there sufficient space between the shoe and the foot to permit chafing. Owing to the structural irregularities of the foot and variations in standard shoe sizes, shoes can be properly fitted only by actual test. Testing may be accomplished either with a shoe fitting machine, or by hand, and is done under the direct supervision of an officer. The shoe fitting machine is a device for measuring the size of the foot when bearing weight and for proving that the size selected is the proper one. These machines are issued as required. Instructions for their operation accompany the machines or are issued by the proper headquarters.

Shoes may be fitted without a machine. (See Plate 4). The shoe should be laced snugly; the wearer with a 40-pound burden on his back then places his entire weight on one foot. To determine the correct width, the leather of the shoe in front of the instep above the ball of the foot should then be grasped between the fingers and thumb. As the finger and thumb are brought together the leather should be loose enough to prevent the fingers slipping easily over the surface but not sufficiently lax to produce a wrinkle. If it wrinkles under the grasp, the shoe is too wide, and if there is no looseness apparent it is too narrow. The proper length of the shoe is determined by the space between the end of the great toe and the end of the shoe, which should be not less than three-quarters of an inch clear space when all the body weight plus that of a 40-pound burden is borne by the foot being fitted. This space is measured by pressing down the leather with the thumb. The width of the thumb may be considered as representing the desired clearance between the toe and the end of the shoe.

New shoes should not be used on a march. Shoes should always be "broken in" first. They may be waterproofed with neatsfoot oil. Waterproofing shoes makes them impermeable to air; therefore, men whose feet tend to perspire should not use waterproof leather. Shoes may be broken in rapidly by standing in about $2\frac{1}{2}$ inches of water for five minutes and then walking about, allowing the shoes to dry on the feet.

Fitting of the socks and the choice of socks is but little less important than the shoes. The best socks for general field service are light weight woolen. Like shoes, they must be properly fitted—large enough to permit free relative motion of the toes but not so large as to wrinkle when the shoes are worn. The proper sock size of woolen socks for a given shoe is indicated in the accompanying table. Cotton socks shrink less after washing and should accordingly be one-half size smaller than shown in the table.

TABLE OF SOCK SIZES, WOOL SOCKS.

<i>Shoe size</i>	<i>Corre- sponding sock size</i>	<i>Shoe size</i>	<i>Corre- sponding sock size</i>
5	10½	9	12
5½		9½	
6		10	
6½	11	10½	12½
7		11	
7½		11½	
8	11½	12	13
8½		12½	
		13	

Socks should be changed frequently; on the march a clean pair of socks should be put on every day. It is advisable to change socks and shoes twice a day whenever practicable, in order to keep the feet dry and to allow the shoes to air out. The shoes and socks should be exposed to the sun during the interim to permit destruction of any possible fungi of athlete's foot. Socks with holes should never be worn on the march.

Bathing the feet deserves special attention. Rinsing off all the soap from the feet and drying them well about and between the toes will assist in preventing many of the cases of so-called "athlete's foot". In this connection exposure of the feet to the air and mild progressive doses of sunshine increases the resistance of the skin to infection. The use of dry, clean socks and shoes is necessary after bathing and drying the feet. At the end of a march the feet should be washed, preferably in cool water, and rubbed briskly with a towel. Foot powder (available for issue to the troops) prevents chafing of the feet and assists in keeping them dry. The nails after bathing are soft and if they need trimming it is a good time to do so.

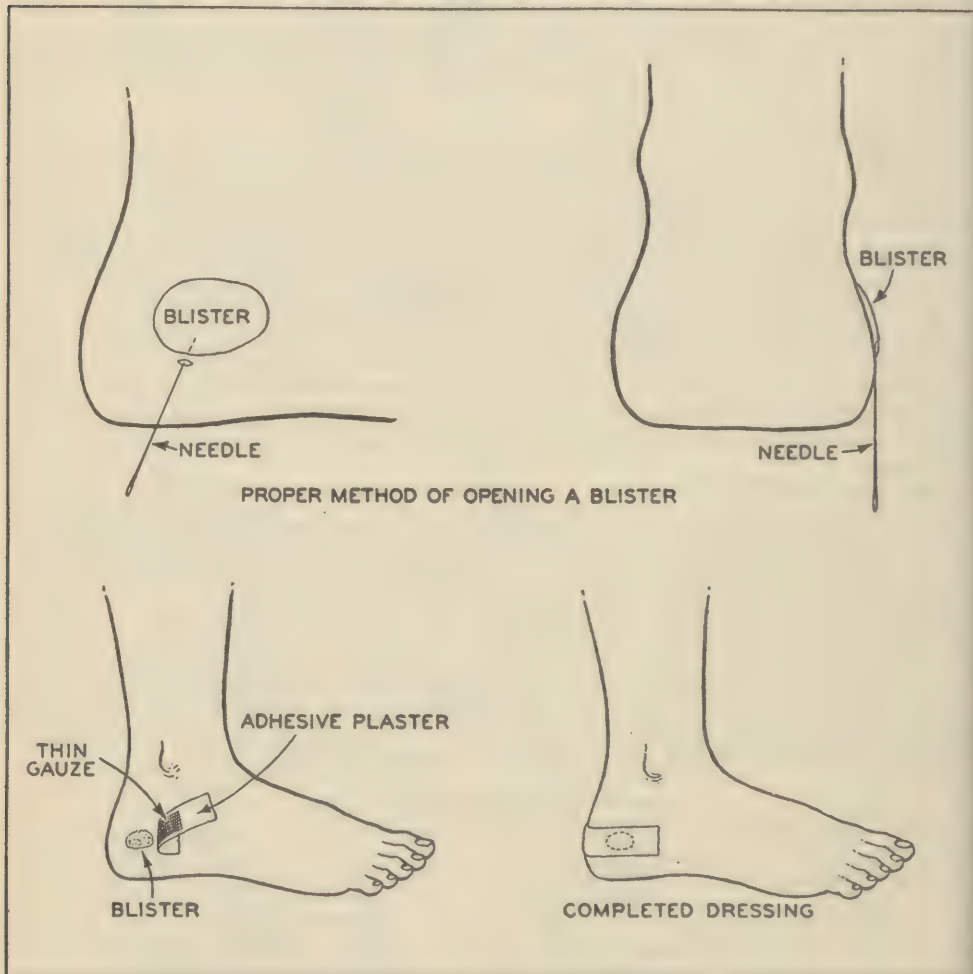


Plate 5. Care of Blisters on Feet.

Blisters of the feet are most frequent among recruits who are not accustomed to long marches and who have not learned the essentials of the proper care of their feet. They are first manifested as a reddened, tender area; at this stage, if such areas are well covered with

smoothly applied adhesive plaster, further damage may be prevented. When the blisters contain fluid they should be opened with a sterilized needle inserted through the undamaged skin just outside the margin of the blister. The fluid is allowed to escape, but the loosened skin should not be removed. The area should then be well covered with one or two layers of sterile gauze and then covered with zinc oxide (adhesive) plaster, smoothly applied (Plate 5). The gauze prevents adhesion between the loosened skin and the adhesive plaster. A man can march with a blister which has been properly treated. Company officers should know how to treat blisters on the feet. Blisters on the feet are prevented by the use of well fitted shoes and socks and proper hygiene of the feet.

HYGIENE OF THE RESPIRATORY APPARATUS

Respiration is one of the characteristics common to all living animals, for it is essential for the chemical changes of metabolism upon which life depends. The body may survive for long periods of time without food but only a few moments without oxygen. The condition of the body and mind will affect the respiratory rate, increasing or decreasing the rate of oxygen and carbon dioxide to the needs of the tissues. Involved in the act of respiration are the nose, throat, trachea, bronchi, and lungs. Health of these vital structures is necessary for proper metabolism.

A healthy nose requires no treatment by means of sprays, nasal douches, and the like. Catarrh of the nose and accessory nasal sinuses is caused by exposure to cold, to dust, and to atmosphere that is too dry, such as in heated houses. The best defense is a healthy body, the avoidance of over-exposure to cold and dust, and the artificial addition of moisture to air that is too dry (air-conditioning). Allergic reactions of the mucous membrane may require the use of some ephedrine or adrenaline compound, preferably in the vapor form so that all parts of the mucosa will be reached. The excessive use of such treatment should be discouraged, and, if of a persistent nature, medical advice should be sought. Obstructions to breathing in the nose should be corrected; however, surgical procedures should be the last resort.

Serious infections of the hair follicles on the inner surfaces of the nose may result from the picking of dried secretions which are adherent to them. It is better to moisten the hairs and clean the surfaces with a soft cloth. Picking the nose is a very unhygienic habit. If infection does occur do not open the infection without consulting a physician as infections of this part of the face improperly treated may lead to fatal results.

The nose performs an important function in warming or cooling the air before its entrance to the lower air passages. Obstruction which causes mouth breathing, such as enlarged adenoids, should be removed by surgical operation. This should be done as early as detected to prevent formation of other nasal affections and to lessen the susceptibility to upper respiratory disease.

When frequent inflammation and soreness of the throat occur, the individual should have his throat inspected by a medical officer who can determine the cause. He can decide whether it is advisable to have them removed. Infected tonsils may cause halitosis (unpleasant breath) or may be the source of other body ailments due to the distribution of infective organisms to the blood stream. Upper respiratory infections may lead to more serious complication such as bronchitis and pneumonia.

The purity of the air inhaled is of vital importance to the health of the lungs. Dust is detrimental to health, and dusty atmospheres should be avoided. Nose breathing rather than mouth breathing will remove many of the dust particles and bacteria since they lodge on the hairs inside the nose. In ordinary amounts they are removed by the reverse action of the *ciliated epithelium* in the bronchial tree that works mucus and dust particles toward the throat and mouth, and by coughing. Irritating substances will cause sneezing, initially, and coughing and sneezing if inhaled in greater concentration.

Pathogenic microbes are constantly inhaled. Among these are the germs of pneumonia, influenza, and tuberculosis. The best defense against these diseases depends on the maintenance of a high standard of bodily health. One should avoid being with the sick unless duty requires it. "Droplet infection" is the means of the spread of respiratory diseases. One should be careful in coughing and sneezing; in attending the sick guard against

exposure through these means. Fresh air is necessary at all times and should be sought in abundance. All rooms should be well ventilated and plenty of fresh air allowed to enter at night. The old superstition about "night air being dangerous to health" is faulty.

Deep breathing exercises are of value in preserving health. The best exercises, however, are those which develop the entire body and not the lung capacity alone. Among those are: running, calisthenics, drill, boxing, vaulting, volley-ball, swimming, hand-ball, squash, baseball, tennis, golf, and football. Vigorous walking is an excellent exercise in which all may indulge wherever stationed, and therefore no officer or soldier should offer as an excuse the lack of equipment for securing adequate exercise.

CARE OF THE EYES

The eyes are one of man's most priceless possessions and should be protected and maintained in normal health as long as life exists. With them most of his pleasures and joys of life become a series of happy pictures that build up a book of not so easily forgotten memories.

Injuries to the eye may be very serious if they involve a penetration of the eyeball. Protective glasses should be worn while engaged in an occupation, such as work on an emery wheel, in which foreign particles may be thrown off to penetrate the eyeball or tissues surrounding the eyeball. The removal of foreign bodies from the eye is related in Chapter VI. Never rub the eyes, as there may be disease germs on the hands. The conjunctiva is very susceptible to infection or injury.

Eye strain from visual defects not only causes local symptoms referred to the eye but constitutional ones such as headache, nervousness, indigestion, insomnia, and dizziness. It goes without saying that usual defects and muscular unbalance of the eyes should be promptly corrected.

In reading and close use of the eyes the lighting conditions are important. The light should be on a level with the top of the head and should illuminate over the shoulder. The proper reading distance is about fourteen inches from the eye. The book should be held nearly on a level with the eyes. Reading in the recumbent position should not be practiced. There is extraordinary strain on the muscles of downward rotation, and the flexing of the neck causes congestion of the eyeballs.

Color blindness is usually inherited but may be due to injury or disease. The presence of adequate vitamins is now considered necessary for the proper color perception.

CARE OF THE EARS

The ears comprise the auditory apparatus and the sense of equilibrium. Disease of the ear often manifest diseases in other parts of the body. Personal care of the ears will assist in preventing affection due to local injury and disease.

Wax or cerumen often collects in the ear. It decreases hearing and may cause inflammation of the auditory canal. Dizziness sometimes arises from this cause. Careful syringing with hot water (105 degrees to 115 degrees Fahrenheit) is the proper procedure for removing the wax. For further details about removing foreign bodies from the ear see Chapter VI.

Scratching the ears, or the habit of inserting the fingers vigorously into the external auditory canal, may be the cause of spreading mycosis infections into the canal and to the ear drum. Handling of the ears should be done with clean hands, and the canal should be kept free of obstruction. Difficult removal should be done only by a physician who has the proper instruments.

Earaches sometimes arise from exposure to cold air or cold water. Nasal douches are at times the cause of inflammations of the ear. The treatment of earache more properly belongs in the realm of medicine rather than hygiene. Suffice it to say here that the application of external heat and the use of warm sterile water for syringing may be beneficial and clear up the condition. If, however, earache is combined with infection of the throat there is possibility of infection of the middle ear. This condition deserves immediate and constant attention by responsible medical authorities.

Therefore, in caring for the ears, cleanliness by gentle procedures, the avoidance of excess exposure to cold, and the prevention or removal of foreign material are the essential features of their hygiene.

SLEEP

The waste products of activity appear to be a prime cause of sleep. It is during sleep that nature repairs the damages incident to the day's activities. It is therefore readily apparent that an adequate amount of sleep should be secured by a person if he expects to maintain efficiency and preserve his vitality. The average person requires seven to eight hours of sleep in twenty-four hours, and it should be taken at regular intervals.

To obtain the utmost benefit sleep should be had under favorable conditions—fresh air, clean bedding, and no crowding of sleeping quarters.

PHYSICAL EXERCISE

Purpose. The effect of exercise on the muscles is to exhaust the material necessary for contraction and the accumulation in the muscle of waste substances produced by its activity. The blood supply to the muscle is greatly increased. The value of muscular exercise lies partly in the fact that the education of nervous centers which have to do with the perception of ideas and with intellectual operations would be extremely incomplete in the

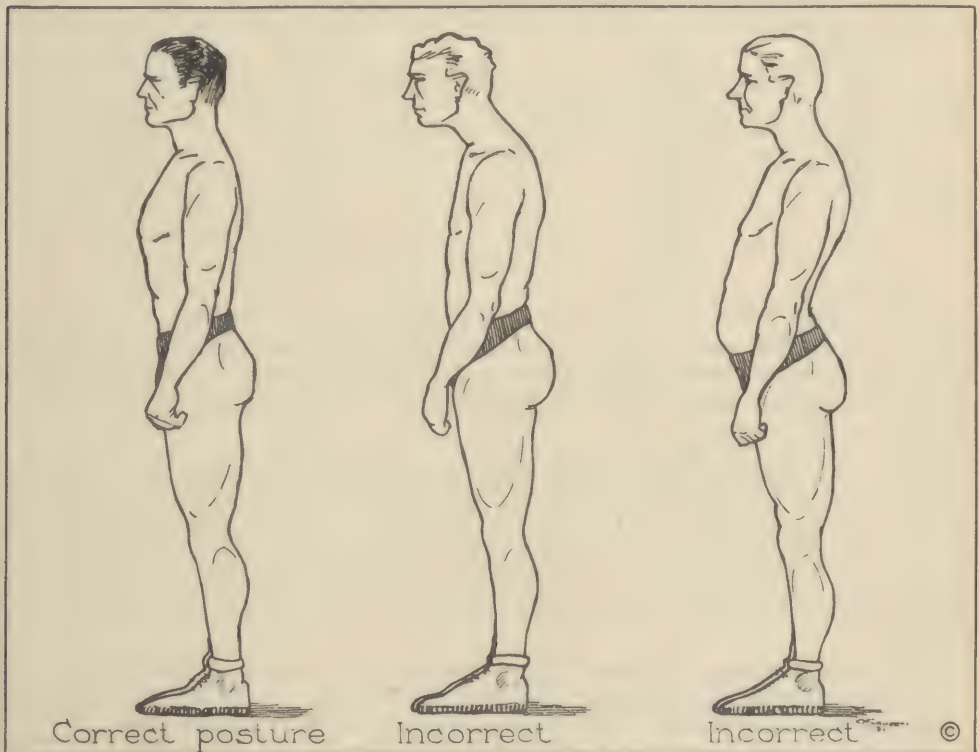


Plate 6. Correct and Incorrect Body Posture.

absence of education of the centers connected with muscular movements. Exercise also stimulates the heart, accelerates breathing and aerates the lungs, dilates the blood vessels of the skin, and causes sweating thus stimulating excretion of waste products through the skin, and increases the appetite and promotes digestion.

Posture. The normal posture, without drooping of the shoulders or twisting of the trunk, is the one in which there is the least possible strain or friction no matter what the amount of physical labor. Consequently in this position there is the greatest amount of physical

efficiency. Any departure from the normal means wastes of energy and lessened efficiency of the individual, both mental and physical.

The position, in the army termed "the position of the soldier," is the normal position of the body. (Plate 6.)

The proper use of exercises, such as obtained in drill and in calisthenics, will improve and correct the posture by stimulation and employment of muscles that are not used in the ordinary roles of occupation. A well performed training exercise will involve to some degree all the muscles of the body.

WEIGHT AND HEALTH

There is a very close relation between weight, health, and longevity. There is a proper weight for every height, and if one weighs very much less or especially very much more than is normal he is more subject to disease and the chance that he will not live as long as if his weight were normal. Consideration must be given of the bony structure and frame of the individual, because his weight may be considerably more than his height would indicate, but still he may not be fat (obese). Obesity is the primary cause for detrimental effects of overweight above the normal standard as shown in the accompanying table. This table gives the ideal proportion in height (inches) and weight (pounds) for young men with the average type of bony and muscular frame:

TABLE OF NORMAL HEIGHT AND WEIGHT FOR A YOUNG MAN.

<i>Height</i> (inches)	<i>Weight</i> (pounds)	<i>Height</i> (inches)	<i>Weight</i> (pounds)
60	120	70	156
61	122	71	161
62	125	72	168
63	128	73	175
64	131	74	182
65	135	75	189
66	139	76	197
67	143	77	205
68	147	78	213
69	151		

A sudden drop in weight to the extent of ten pounds deserves immediate medical investigation. Exercise and climatic changes will account for small variations in weight; however, the weight should be closely guarded and maintained as near the ideal as the body frame will permit.

HYGIENE OF THE GENITO-URINARY SYSTEM

The genito-urinary system of the male is a complicated mechanism which suffers quickly from abuse. Cleanliness of the external genitalia is extremely important, since the crotch perspires freely, and this moisture tends to collect dust and dirt particles. This moist area also provides a good media for the culture of fungus infections, and caution should always be taken after a bath to dry this area before drying the feet, where athletes' foot disease may be present.

If the foreskin is long, care should be taken to remove the collection of material around the tender portion of the penis by rolling back the foreskin and washing the parts with warm water and a mild soap. Thorough drying with a soft towel should follow. Failure to clean the under surface of the foreskin may lead to infection and abscess formation. The operation for the removal of the redundant portion of the foreskin (circumcision) is not difficult and not disabling. The individual with an excessively long foreskin who has difficulty in maintaining cleanliness should subject himself to this type of operation. In some cases it will tend to relieve irritation which may cause priapism and incite masturbation.

Sexual Hygiene. The force of the sex impulse reaches its maximum between the ages of twenty and twenty-five. The vigor of the sex instinct and the powers of control are hereditary, but the vigor with which he will apply the brake rests upon his enthusiasm in support of the idealism in which he was reared. A large proportion of mankind has masturbated to

some extent at some period in their lives, and probably less than ten per cent of such masturbators have been physically injured by the habit. However, if long continued, it unmans him, makes him untrue to himself, and cowardly; fortunately most individuals find this out and give up the practice. Masturbation is indulged in excessively more often than sexual intercourse since the latter requires the consent of two individuals and opportunities which are comparatively hard to find. Relief from this habit is best obtained by absolute purity of thought, and subsequent marriage, to regulate sexual hygiene. Encouragement to continence should be supplemented by active physical and mental exercise, sanitary living conditions, and social contacts that avoid sexual stimulation. The happily married man rarely complains of any disorder of the genito-urinary system. No instruction in this subject can equal that of the parent, whose moral influence outweighs all the angles of amateurishness. Every man has the right to know the essentials and importance of sex life, and what is not learned from the pure source will invariably be completed from the wrong source.

Venereal Disease. Sexual indulgence by young unmarried men is responsible for an immense amount of disease and suffering. This is true not only among the men themselves, but also in later years among their wives, to whom they give the disease although they may believe they have been cured, and among their children, to whom the malady may be transmitted even before birth. Abstinence from sexual intercourse is the only sure means of maintaining sexual purity and hygiene. While it is a common belief that the sexual act is necessary to maintain the health or powers of man, this is a fallacy having no foundation in scientific fact.

If the individual about to participate in illicit sexual intercourse would first consider that venereal disease attacks more than half of the young men, affects thousand of children, and hundreds of thousands of women, that his chance of remaining free after intercourse is less than 30 per cent, he would at least take all the preventive and prophylactic measures available. Gonorrhea causes at least 50 per cent of the involuntarily sterile and destroys the power of procreation in man as well as in woman. Add to that the perils of syphilis, chancroids, and lymphogranuloma inguinale and it would appear there is little reason for failure to take necessary precautions, or better still abstinence.

If, in spite of the moral and physical prohibitions against it, illicit sexual intercourse has been indulged in, then a prophylactic treatment should be taken. This is for the benefit of the person himself and for the good of the group as a whole. Treatments should be taken as soon after intercourse as practicable, certainly not later than two hours after initiation of sexual intercourse. One hour afterward has proven to be the maximum limit to which full benefit from prophylaxis is received.

Sexual information should be sought from the proper sources, and especially accurate information regarding the spread of venereal diseases, their effects on the human body, and the methods of prophylaxis. For further details about venereal diseases, their prevention and control, see Chapter IV.

CHAPTER VI

FIRST AID

Definition. First aid includes the immediate, simple measures or precautions which are taken by a sick or injured person, or by others present, pending the arrival of a doctor. Few people know the proper thing to do or not to do in case of accidents or sudden emergencies that endanger human life. A little knowledge applied with judgment and common sense constitutes the best and most efficient first aid measure.

Purpose. The subject of first aid is of vital importance to the medical officer, to the enlisted men who assist him, and the troops he serves. The medical detachment of the war strength infantry regiment consists of 96 men, all of whom must be adept in the rudiments of this subject in order that they may perform their missions effectively. Similarly, but to a lesser degree, officers and men of line units must be instructed in first aid so that in emergencies, in the absence of Medical Department personnel, constructive measures may be applied to save life or reduce the hazards of injury. This requirement poses a difficult task. It will fall to the medical officer. If he has well-instructed men about him as assistants, when the time comes that wounded men in large numbers arrive for medical care he will be able to attend a few more, or perhaps a large additional number. He cannot perform his battle mission alone and unaided. Thus, unlike the civilian practitioner, the medical officer must assume an additional and difficult task in training a large number of men in this subject.

The purpose of this chapter is to serve as a guide in this difficult training process. It is based upon Army experience, and the subjects discussed can be taught successfully to soldiers. The methods presented are practicable, but it is fully realized that there are others which may accomplish as good results. The medical officer will draw deeply upon his own knowledge, experience, and skill, adding other subjects which will be necessary to meet the unusual conditions which may be encountered.

Nor is it alone sufficient to select accurately the subjects and methods to be taught. The instructor will fail unless he uses teaching methods appropriate to the personnel available to him. The soldier is a practical man. He does not aspire to become a doctor, nor will he absorb knowledge in the same manner or degree as the student in medical school. Nevertheless, when taught by efficient methods, he can learn these things and learn them well. A different teaching technique is required. Each subject must be broken down into its essential elements, and each carefully explained in language, non-technical in nature, which the soldier can understand. A detailed demonstration of the subject explained must then be given to show the soldier exactly what is to be done. Thus he learns with his eyes as well as his ears. He is then ready to undertake practical application and perform the task which has been explained and demonstrated. Finally, since he too may be responsible for human life pending the availability of a medical officer, he must be tested to insure that he is equipped with at least the minimum skill to justify entrusting him with the heavy responsibility he must bear.

All this forces the medical officer to plan his instructional task, secure the necessary equipment for demonstration and practical work, and make certain that he is adequately prepared. It will tax his ingenuity. There will always be a shortage of Time. He can anticipate a turnover of personnel with a constant influx of new men. Quite likely he must conduct his training program while performing the routine task of caring for the normal numbers of sick and injured to be expected during periods of training. None the less, the task must be accomplished. The reward which accrues to the medical officer who trains his men well is material. He will be able to perform more medical tasks; he will be able to do them better as he can free himself from many simple tasks; and, finally, he can do them easier and quicker. The ends justify the pains it will require.

MILITARY MEDICAL MANUAL

TRAINING IN FIRST AID SUBJECTS

Inasmuch as one of the most common first aid measures necessary in military and civilian life is the care of fractures, it is included below as a method of instruction. The application of the Army leg splint serves as an excellent example and is therefore selected in preference to others. Note that the principles of training are employed using explanation, demonstration, application, and correction of errors. Proficiency is accomplished by repeated instruction and application. Whenever competition can be injected more enthusiasm and interest is created, adding to the value of the instruction by emphasis of the fundamentals and important steps of the procedure. Using the group method of training large groups of individuals, such as enlisted men of an army unit, can be instructed simultaneously. The smaller the group the more effective will be the training.

Training of troops in the application of the Army leg splint should be preceded by instruction in elementary anatomy, together with demonstrations and charts of fractures, their diagnosis and complications and treatment of shock. After stressing the importance of early splinting, precautions regarding splints, and a demonstration of standard types of splints, the instruction can then progress to the actual application of the Army leg splint. Careful handling of the injured leg should be emphasized.

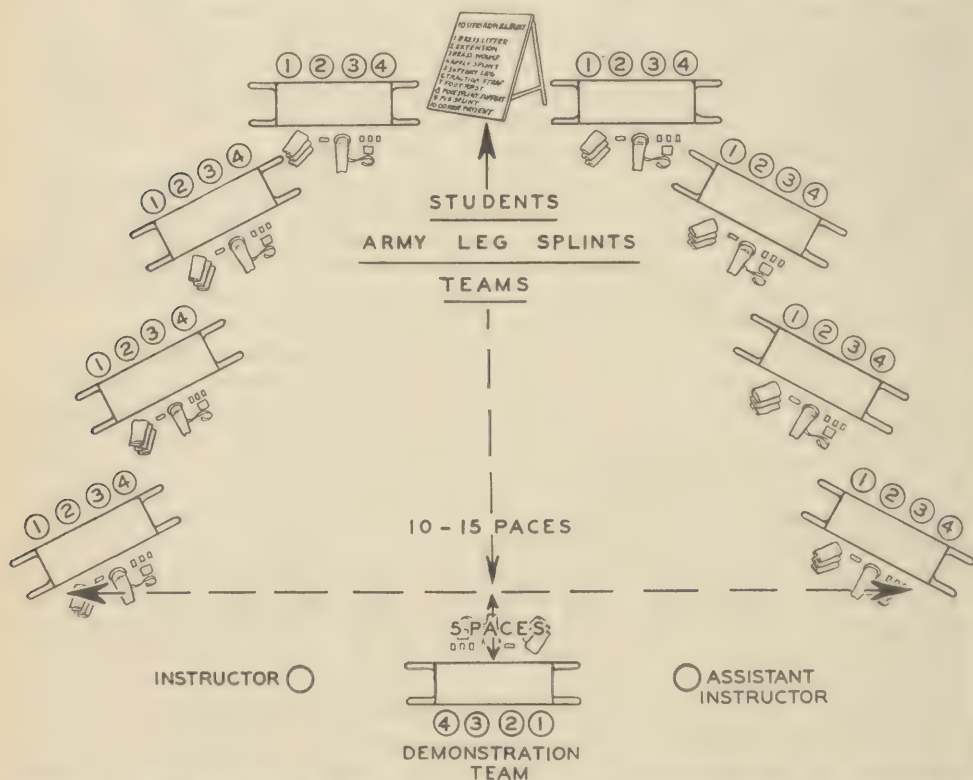


Plate 1. Group Method of Training. Step by Step Demonstration and Application of the Army Leg Splint.

The students should be given specific text references for study in advance of the demonstration and informed to wear the uniform desired. The demonstration troops required will vary according to the number of students to be instructed but may be determined on the following basis: one officer, the instructor in charge; one noncommissioned officer, the assistant instructor; one demonstration team of four well-trained men for each 24 to 33 students; and one additional man for each student team to act as the patient (No. 4 man of the student team).

Prior to the arrival of the troops to be instructed, the required number of litters (litter, standard wooden pole or aluminum pole) should be opened and the following equipment placed in front of each litter (See Plates 1 and 2):

- 1 splint, Army leg, half-ring, hinged, Item 37500.
- 1 foot rest and splint support: New Item 37515. (If Item 37515 is not available, 1 of Item 37510, splint support, and 1 of Item 37520, splint rest, can be used.)
- 1 splint strap, adjustable traction, Item 37455.
- 2 rolls of muslin bandage, 5 inches by 5 yards, Item 20090.
- 1 roll gauze bandage (3 inch).
- 3 blankets.
- 6 safety pins, medium size.
- 1 first aid packet, Item 20310 (Instructional).

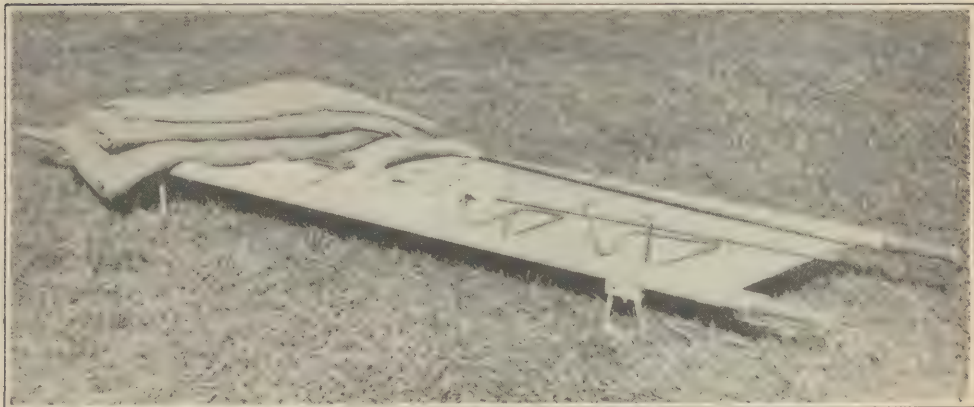


Plate 2. Equipment Required for Each Student Army Leg Splint Team.

A large chart showing the steps in application should be posted visible to the demonstration team. (See Plates 1 and 3.) The members of each demonstration team should be placarded "1, 2, 3, and 4," and designated as follows: 1—The Operator; 2—The First Assistant; 3—The Second Assistant; and 4—The Patient. The arrangement of the litters, splint equipment, and student teams in relation to the demonstration team is shown in Plate 1. All team members are designated and take their positions from right to left, 1, 2, 3, and 4, respectively.

The procedure of the period of the instruction is as follows:

The demonstration team marches to its litter at the head of its respective group of litters. The members of the team check their equipment.

The demonstration team is formed for instruction as shown in Plate 4, each member taking his respective position as placarded from right to left.

The officer instructor or the assistant instructor forms the class and introduces the demonstration. The students are assigned so that there are three students to each litter. The additional men employed as patients take the No. 4 positions. When additional men are not available, a student is used as a patient; later during the instructional period this student is given the opportunity to act as the operator.

The students take their positions at their respective litters, facing the demonstration team. The officer instructor or the assistant instructor then has the demonstration team count off, after which the class teams count off. Having designated which is the injured leg he proceeds with the ten steps in the application of the Army leg splint. It is assumed that the wound of the compound fracture has a sterile protective dressing already applied to it. The instructor briefly describes each step, has the demonstration team slowly demonstrate it, answers any questions pertaining thereto, and has each student team in the group apply the step in the same manner. After having carefully

corrected all errors, if any, made by the student teams in the application of that step, the instructor is ready to proceed in the same manner with the subsequent step. Additional instructors, if available, may be used to check the correctness of application of each step by the students.

The demonstration includes the following steps in the sequence given below:

Step No. 1, Dress litter. The litter is "dressed" by Nos. 2 and 3. A litter is said to be "dressed" when blankets have been arranged upon it as follows: Place the first blanket on the litter lengthwise so that one edge corresponds to the outside pole of the

10 STEPS ARMY LEG SPLINT

1- DRESS LITTER

2-EXTENSION

3-DRESS WOUND

4- APPLY SPLINT

5-SUPPORT LEG

6-TRACTION STRAP

7-FOOT REST

8-FOOT SPLINT SUPPORT

9-FIX SPLINT

10-COVER PATIENT

Plate 3. Chart Showing the Steps in the Demonstration and Application of the Army Leg Splint.

litter and its upper edge is even with the head end of the canvas. Then fold it back upon itself once, leaving the folded edge even with the inside pole of the litter. Place the second blanket lengthwise on the first so that one edge corresponds to the opposite pole of the litter and its upper edge is even with the head end of the canvas. Then fold it back upon itself once in the same manner as the first. The free edges of each of these blankets hang over opposite sides of the litter. (See Plate 5.) The No. 4 man now lies on the litter with his head at the No. 4 position and acts as patient. The third blanket is folded and placed under the patient's head until the tenth step. (See Plate 6.)

Step No. 2, Extension. The No. 2 man of the team stands at the foot of the litter, facing the patient. Grasping the heel of the shoe with his right hand and the toe with his left, keeping the arm straight, he exerts a steady pull to produce the necessary extension. (See Plate 7.) The litter slings (on old type litters) may be placed across the patient's chest, under the arms, and attached to the litter stirrup to provide counter-



Plate 4. Demonstration Team, Army Leg Splint Application.



Plate 5. Step No. 1, Dressed Litter, Ready for the Patient.



Plate 6. Completion of Step No. 1, Army Leg Splint Application.



Plate 7. Step No. 2, Extension, Army Leg Splint Application.



Plate 8. Step No. 3, Dress Wound, Army Leg Splint Application.



Plate 9. Step No. 4, Rotating the Army Leg Splint into Position.

traction. Traction should be continued until the traction strap has been fixed. The No. 3 man supports the calf and thigh of the injured leg during Steps No. 1, 2, 3, and 4.

Step No. 3, Dress wound. While extension is continued by No. 2, the No. 1 and No. 3 men dress the wound previously designated by the instructor. (See Plate 8.)

Step No. 4, Apply splint. The splint is applied by rolling it from the outside inward, the short rod to the inner side of the leg and the half ring well up under the buttock, so that it will rest against the pelvic bone and furnish proper counter-traction (See Plate 9.) The splint must be horizontal. It is held in place by buckling the upper strap.

Step No. 5, Support leg. The leg is supported on the splint by arranging the muslin bandages in the following manner. (See insert, Plate 10).

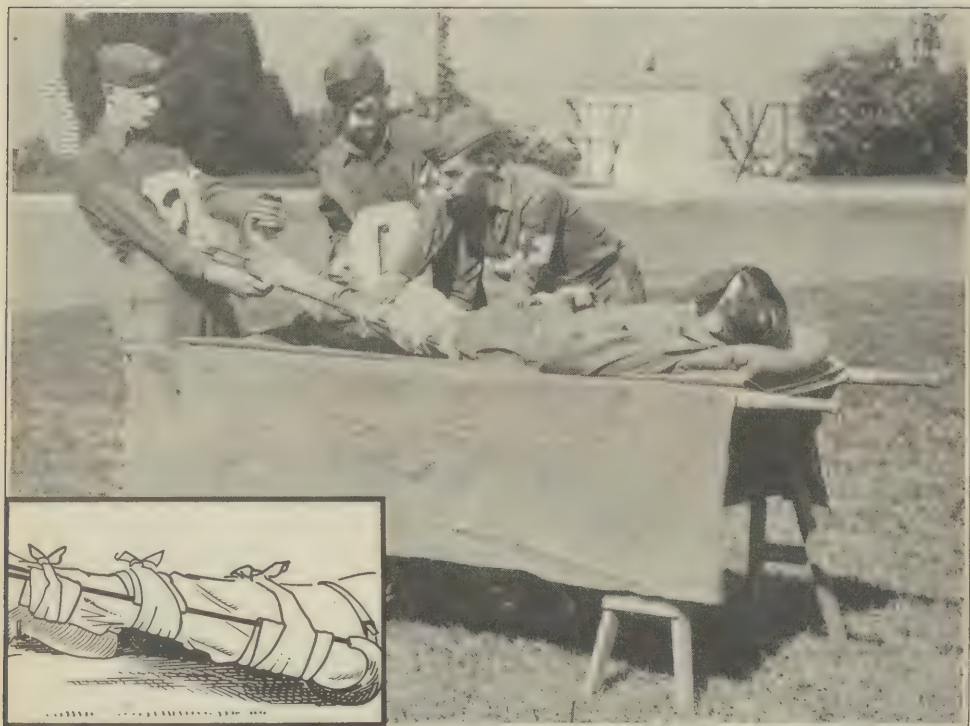


Plate 10. Step No. 5, Support Leg, Army Leg Splint Application.

The first bandage is placed across the upper part of the splint under the thigh. The ends of the bandages are then reversed by crossing them under the splint and tying above and to the side.

The second bandage is applied above the ankle in the same manner as the first.

The third bandage is placed just above the knee. The ends are drawn downward between the two side rods of the splint and knee. They are then folded upward and tied.

Note: The positions of the bandages may vary, depending upon the location of the fracture. A fourth muslin bandage may be placed under the calf of the leg for additional support. If time permits the splint can be cradled with bandages.

Step No. 6, Traction strap. The traction strap is applied to the foot by the No. 1 man. The loop of the strap is first placed behind the heel and under the foot; the short buckling strap is brought over the top of the instep and buckled on the inside of the foot. The long strap is then brought over and under the end of the splint, is folded back upon itself, and inserted through the metal ring. Traction is then maintained by pulling on the free end of the strap. The free end is now secured by tying with the ordinary cinch knot. (See Plate 11.)

Step No. 7, Foot rest. The foot rest is attached to the splint with lower hooks downward



Plate 11. Step No. 6, Traction Strap, Army Leg Splint Application.

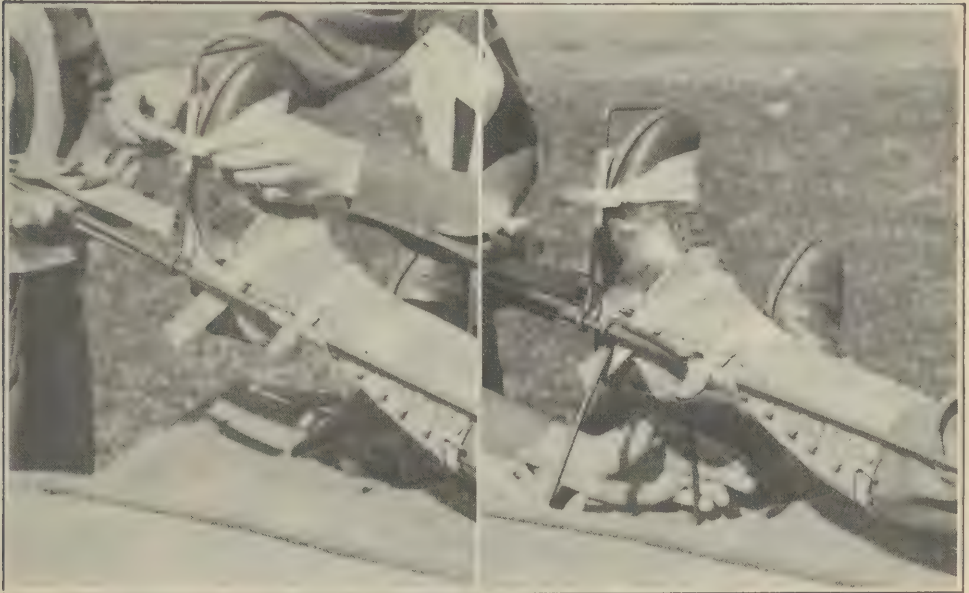


Plate 12. Step No. 7, Foot Rest, Army Leg Splint Application.

Plate 13. Step No. 8, Foot Splint Support, Army Leg Splint Application.

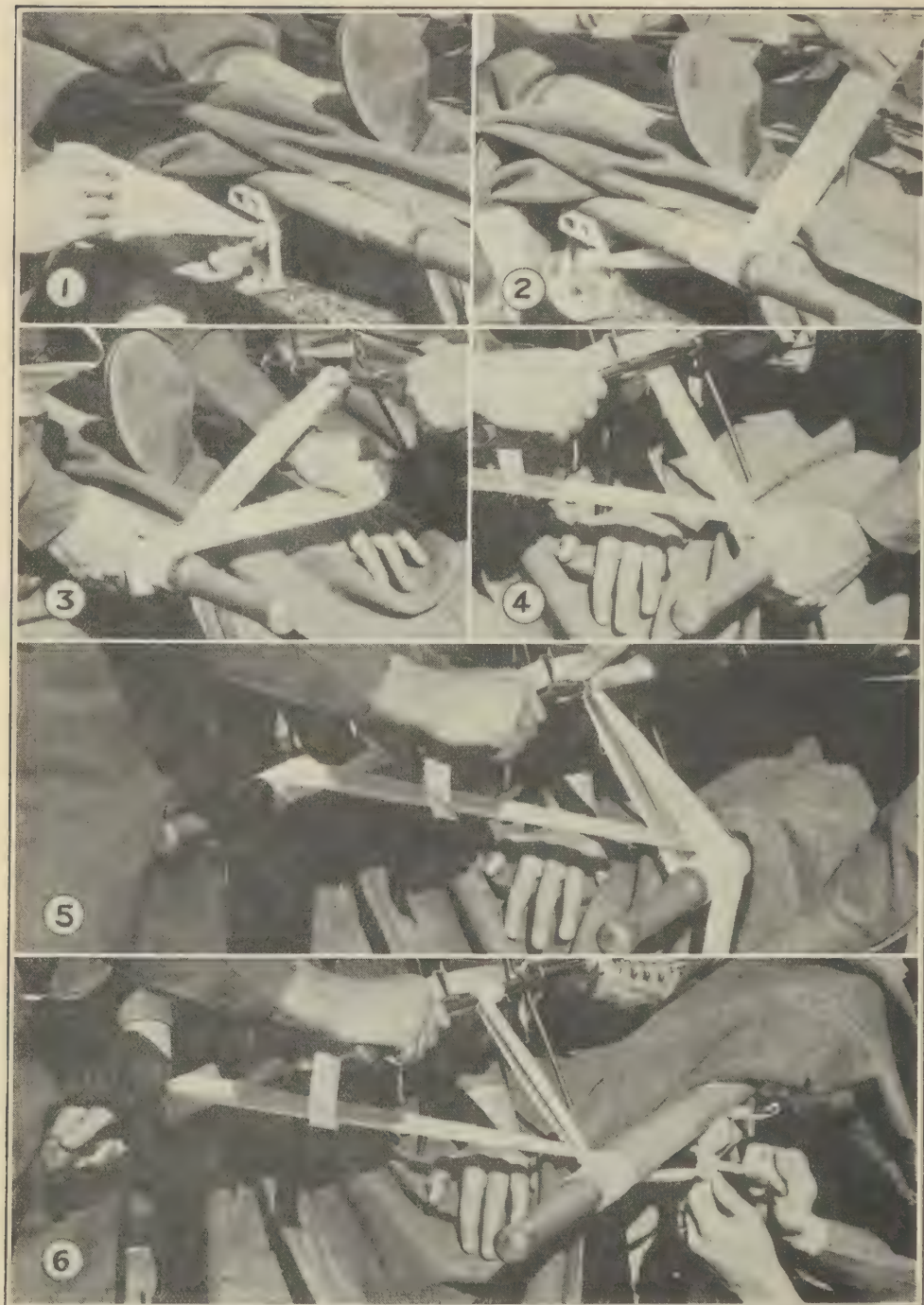


Plate 14. Step No. 9, Fixation of the Army Leg Splint to the Litter.

and inside the splint rods. The foot rest is pushed against the shoe to prevent foot drop. Spread the foot rest, if necessary for a more secure fit. Secure with bandage to prevent lateral movement of the foot. (See Plate 12.)

Step No. 8, Foot splint support. The Army leg splint is applied with the splint support fastened to the side bars of the splint in such a position that it will rest on the litter not nearer than $1\frac{1}{2}$ inches from the end of the canvas (Plate 13). The splint support will normally rest not on the canvas of the litter but upon the blankets of the dressed litter.

Step No. 9, Fix splint. Take a roll of bias muslin bandage (Item 20090) and stretch it to its greatest length. (Note the bandage is kept under constant tension as it is applied in order to overcome its elasticity. The small amount of elasticity remaining is considered beneficial. In an emergency, wire, rope, or other material can be used for fastening the splint to the handles of the litter.)

Tie one end of the bandage to the litter stirrup on the side of the fracture; place the knot near the pole (Plate 14, Fig. 1).

(Note: The knot is placed on the stirrup near the pole and the bandage around the handle near the edge of the canvas to keep the bandage from slipping and becoming loose.)

Keeping constant tension on the bandage carry it to the inside of the handle close to the canvas and wind around the handle twice (Plate 14, Fig. 2).

Carry the bandage to the near side rod of the leg splint keeping it perpendicular to the splint. Wind the bandage around the side rod twice and carry it back and around the same handle. Then press the splint firmly down on the litter and continue the constant pull on the bandage so that all the slack in the bandage going from the litter to the splint and from the splint back to the litter will be taken up (Plate 14, Fig. 3).

(Note: The bandage from the handle to the leg splint must be perpendicular to the splint so that lengthwise movement of the splint will cause this bandage to tighten all the more. If not perpendicular the bandage will relax if the splint is moved toward one end of the litter.)

Then carry the bandage across the litter to the opposite handle and wind around it twice (Plate 14, Fig. 4).

(Note: For short men the bandage might be carried directly across to the other side of the leg splint and down to the handle on that side. However, for tall men this cannot be done because the bandage would have to pass under the foot and in pressing up on the same would disturb the alignment of the leg. Also returning to the same handle it is easier to draw the leg splint down tight upon the litter. By making knots only at the two stirrups, the bandage can be salvaged for future use.)

Next secure the side bar of the splint on the far side the same as was done on the first side, anchoring the bandage by tying it to the stirrup (Plate 14, Figs. 5 and 6, and Plate 15).

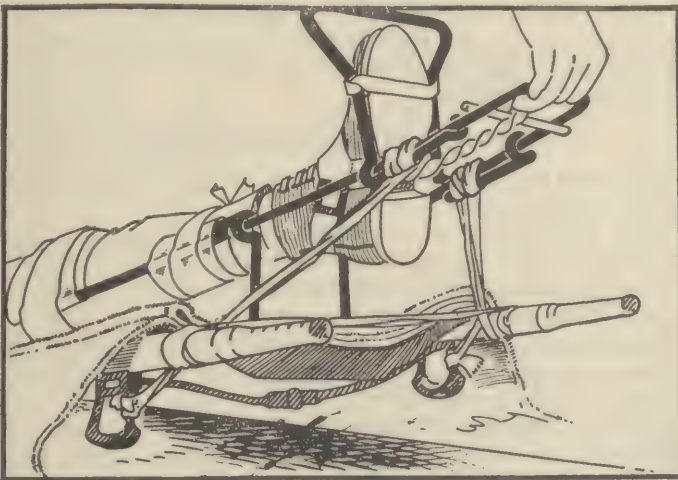


Plate 15. Test of Proper Application of Fixation for the Army Leg Splint.

(Note: If the bandage has been drawn tight during its application, the patient and the litter can be lifted by lifting the Thomas Leg Splint without appreciably loosening the attachment of the splint to the litter. This test is made only in training.)

Check the fixation by lifting the splinted leg and the end of the litter (Plate 15).

Step No. 10, Cover patient. Fold the third blanket once lengthwise and place it over patient, the upper edge under the chin. Next fold the free edges of the first two blankets over the third and hold them in place with safety pins. Inclose the feet of the patient by folding the lower ends of the blankets. This gives *four thicknesses of blanket over and four under* the patient, thus assisting in the prevention of shock. (See Plate 16.)

Each step must be carefully checked to insure accuracy in application. If time permits the positions of the students within teams may be changed and the demonstration and application repeated without explanation. Instructors must check carefully for errors and correct them.

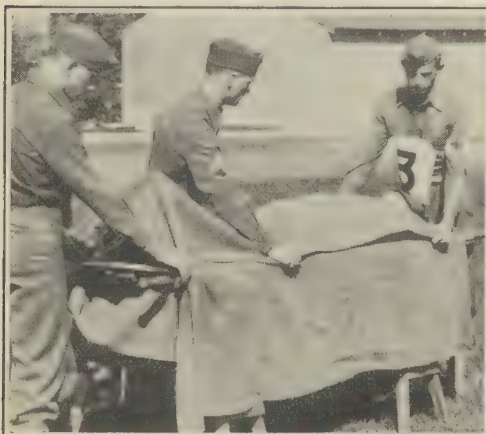


Fig. 1. Third Blanket Placed Over Patient (Side View).

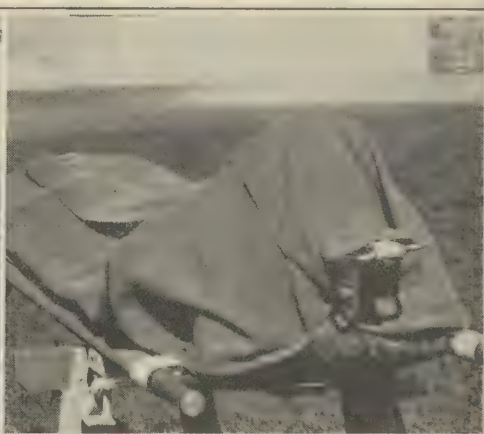


Fig. 2. Patient with Army Leg Splint Applied Ready for Transportation (End View).

Plate 16. Step No. 10, Cover Patient, Army Leg Splint Application.

In the absence of the adjustable traction splint strap, a muslin bandage, used as an ankle hitch, and a Spanish windlass may be substituted in Step No. 6. (See Plate 17.)

Ankle hitch. To apply the ankle hitch, the No. 1 man, assisted by No. 3, applies the muslin bandage as illustrated in Plate 17.

Spanish windlass. The two free ends of the bandage (A and G) are crossed under the instep of the shoe; one free end is then passed *over* and one free end *under* the end of the splint. The two ends are brought together and securely tied to the notch at the end of the splint. A six-inch stick or nail is now inserted between the two ends of the bandage just above the tie. The stick or nail is fixed between the two rods of the splint. (See Plate 17, Fig. 6.)

STANDARD RULES OF FIRST AID

In order to insure and increase efficiency there are several principles and rules necessary in the administration of first aid:

Keep cool: a life may depend on your ability to keep calm and not get excited. It will help to employ the most rational treatment for the case involved.

Examine the patient gently, being careful to avoid touching a wound with anything unclean, such as dirty fingers, dirty clothes, or dirty water.

Check hemorrhage quickly either by compression or tourniquet. Use the cleanest materials available to avoid unnecessary future infection. Make application at site which will stop hemorrhage and cause least damage.

Send for a doctor or ambulance if necessary. Do not try to do too much but make the patient comfortable and keep him quiet until the doctor arrives.

Keep the crowd back, enlisting the aid of a willing assistant to do this while you render first aid. Then act quickly but quietly, being systematic in your examination and treatment.

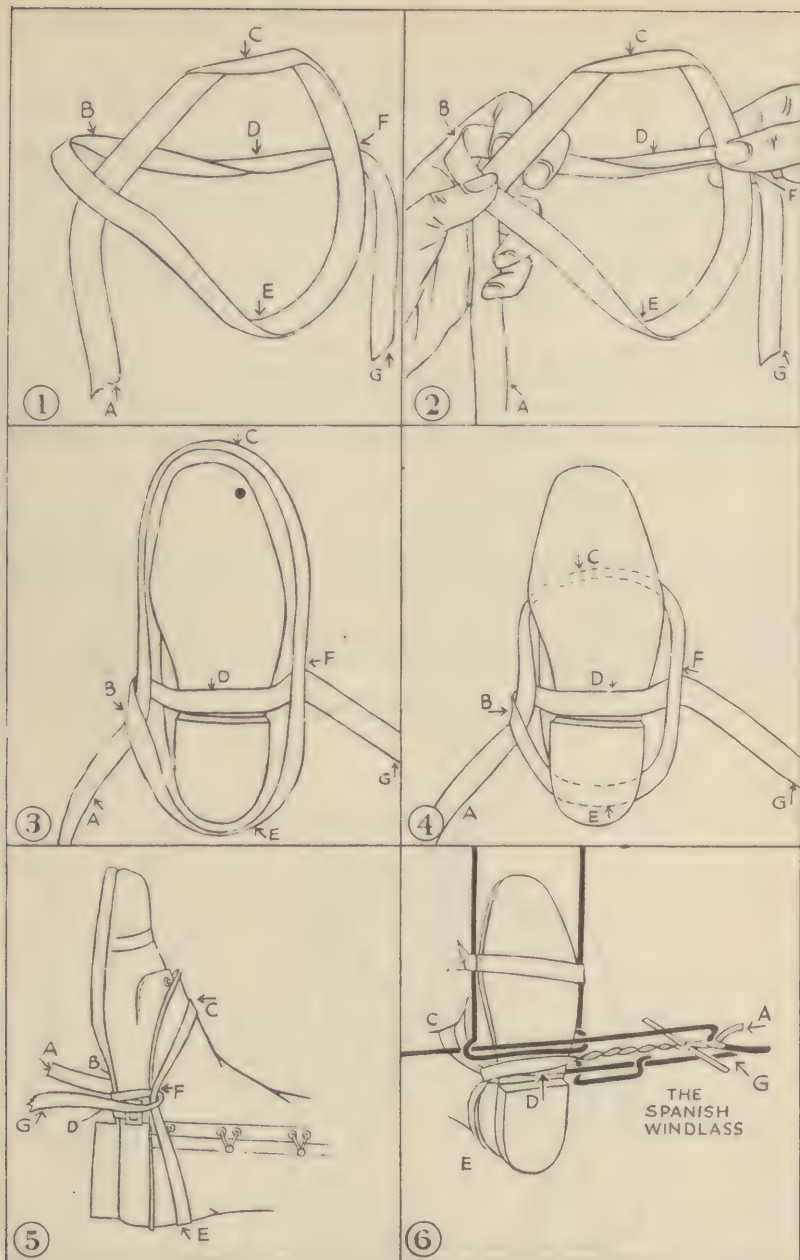


Fig. 1. Muslin Bandage.

Fig. 3. Applying Hitch to the Foot.

Fig. 5. Side View, Ankle Hitch in Position.

Fig. 2. How to Hold Muslin Bandage.

Fig. 4. Adjusting Hitch into Position.

Fig. 6. Spanish Windlass.

Plate 17. The Ankle Hitch and Spanish Windlass. Substitute for Step No. 6.

A piece of muslin bandage about one yard long is held in the left hand, one-third falling to the left. Pick up the long end with the right hand and form a loop. Drop the long end over the loop as if to tie a single knot but do not bring it through the loop. The hitch is now ready to apply to the foot. Hold the hitch with the left hand at the point marked "B" and with the right hand at the point marked "F". Place that part of the loop marked "C" over the foot at the point marked "C" in the diagram. (Plate 17, Fig. 4.) That part of the loop marked "D" under the instep and that part of the loop marked "E" is placed back of the heel at the point marked "E". Draw the hitch into position and apply the Spanish windlass.

Loosen clothing and keep patient warm. In most instances the emergency will indicate the increase of heat, rather than the application of cold.

Splint fracture cases where they lie, using the nearest satisfactory means of splinting that are available. If the fracture is compound, bandage with sterile material before splinting.

Do not give anything by mouth if there is injury to the abdomen. Alcoholic stimulants are not advocated without exceptional reasons, as it may incriminate the injured if the accident is investigated by military or civil authorities. In most cases, the use of water, hot coffee, or similar liquids is beneficial.

Relieve pain wherever possible. Put the patient in the most comfortable position and if his condition will permit remove him carefully to a clean, quiet area away from curious spectators.

Treat the patient primarily, giving him the advantage of the best knowledge you have. His general condition may not tolerate much physical treatment initially. Remember that shock is a very serious condition, and careful handling may save life. Avoid transportation immediately if the wounded will suffer more shock or injury incident thereto. This is quite often true of fracture cases or back injuries.

BANDAGING

The application of bandages is an art which, like all other arts, improves with experience and the interest and skill of the operator. It is used in first aid, orthopedics, and surgery.

Purpose. The purposes for the application of bandages are as follows:

To apply pressure on various parts of the body in order to control bleeding.

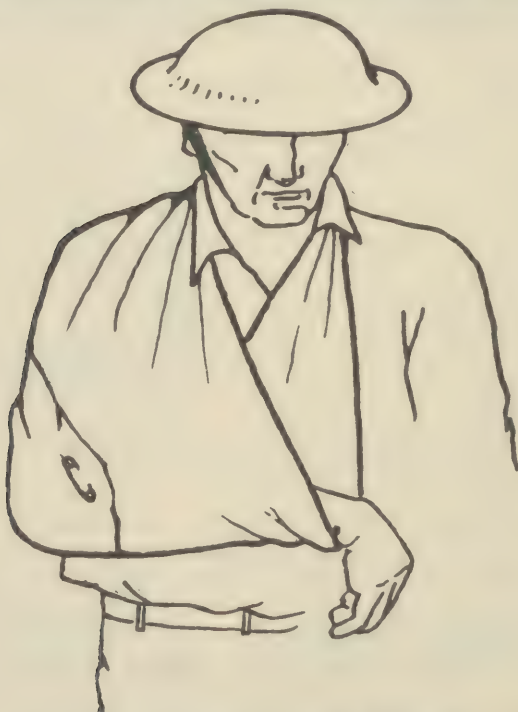


Plate 18. Triangular Bandage as Sling.

To hold surgical dressings, medicinal applications, or splints in place.

To hold or immobilize a part in order to afford support and protection to injured limbs.

In so doing they may also be used to correct a deformity.

To promote the absorption of fluids or exudates.

To support weakened blood vessel walls and to prevent edema and swelling.

To protect open wounds from infection or further infection.

Bandages may be made of various materials, the most common being gauze, zinc oxide adhesive plaster, muslin, crinoline powdered with plaster of Paris, rubber, absorbent cotton, felt, and elastic webbing. Careful selection of the proper material for bandaging should be practiced for the purpose for which the bandage is employed.

The types of bandages similarly are selected for the purpose for which they are applied. The most common of these types with a brief discussion of their uses are:

The triangular bandage. (See Plate 18.) Used as a sling to support the arm or hand, or to hold dressings in place on the shoulder, hand, foot, hip, or buttocks. Substitutes for the triangular bandage are the handkerchief bandage, the tailed bandages, T-binders, and the cravat.



Plate 19. Bandages for Head and Arm.

The roller bandage is most commonly used. It may be prepared or purchased in sizes varying from $\frac{1}{2}$ inch to 12 inches in width and 1 yard up in length. The size of the bandage should vary according to the part of the body being bandaged. It is used especially on the head and limbs. (See Plate 19.)

Adhesive plaster (Zinc oxide tape) is considered a type of bandage since it is used to retain many dressings in place by employing its adhesive qualities. It is prepared as a roller bandage and is used as such. The mole-skin adhesive is used, especially in traction for fracture cases because it is stronger and does not lose its elasticity when subjected to tension for a long period of time.

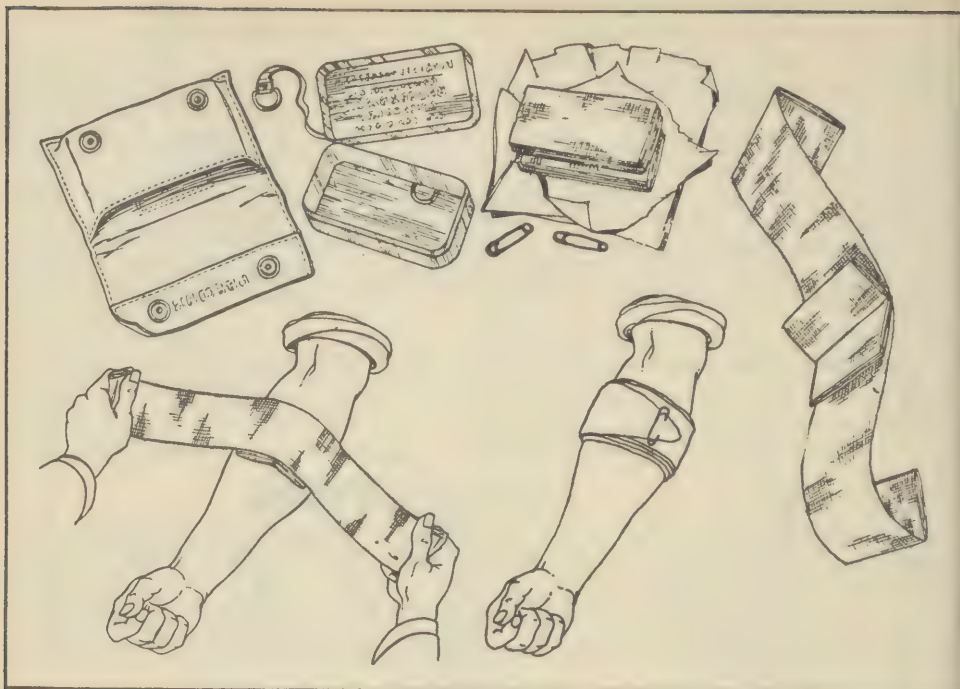


Plate 20. First Aid Packet (Old Style).

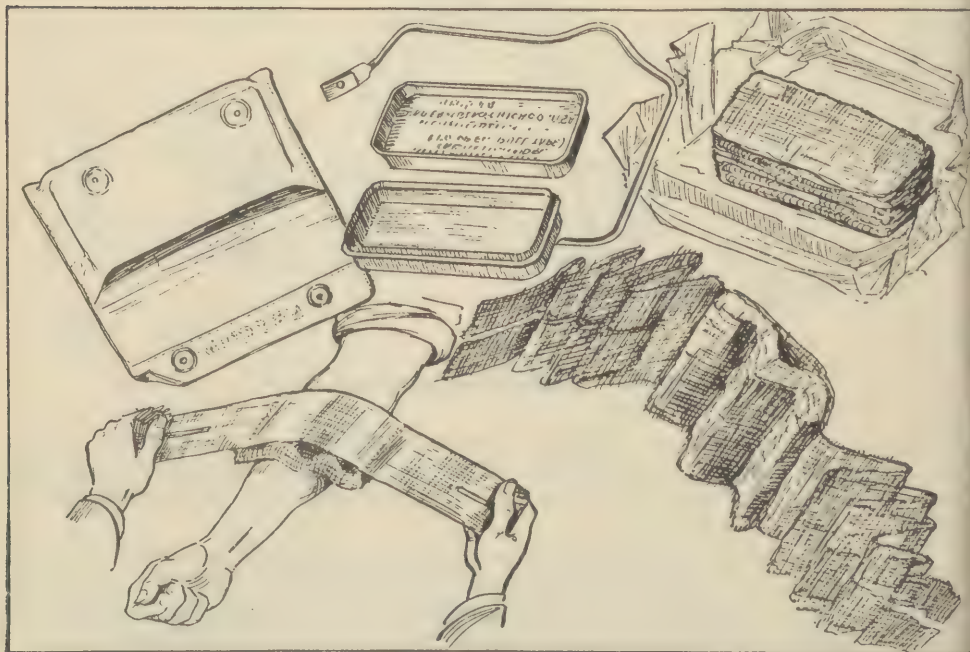


Plate 21. First Aid Packet (New Style).

Army First Aid Dressings. The shell wound dressing, which is a larger dressing used in the field, is supplied to the personnel of the Medical Department. This type of dressing consists of compresses made from a yard of sterile gauze, folded to measure 6 by 9 inches and with attached bandage 3 inches wide by 48 inches long. In addition, there is one bandage 3 inches wide by 5 yards long, and two safety pins. The whole is wrapped in waxed paper and is known as the "shell wound dressing." The use of this dressing is comparable to a large abdominal pad, and it can be used for this purpose.

The individual first aid packet is included in the field equipment of every officer and soldier in the military service. It is carried in a separate, small web pouch attached to the pistol or cartridge belt of the officer or soldier. At present there are two types of first aid packets for issue, commonly known as the "old" and the "new." The slight difference between them will be briefly described. Eventually all will be of the new type.

The *old type packet* contains two sterile dressings, ready to apply to a wound, each wrapped in waxed paper, and two safety pins. Each dressing consists of a pad or compress of gauze, folded to $3\frac{1}{2}$ by 7 inches, which is securely sewed to the middle of a gauze bandage which is 4 by 84 inches. (See Plate 20.) The pad of gauze is folded in such a way that it can be readily opened to twice its original size by breaking a single retaining thread, thus making a pad 7 by 7 inches. These two dressings and the safety pins are inclosed in a sealed metal container 1 by $2\frac{1}{2}$ by 4 inches which is opened by pulling on the metal ring attached to the sealing strip. When the packet is inserted in its carrying pouch the ring should be "down" (at the bottom of the pouch) so that when the packet is pulled out for inspection it will not be accidentally opened.

The *new type packet* contains a single sterile dressing wrapped in waxed paper. No safety pins are provided. The dressing consists of a pad of cotton and gauze, folded to 4 by 72 inches. The metal container has a sealing device different from the old type which makes it easier to open and also makes it less likely to be accidentally opened. (See Plate 21.) The container is about the same size as the one for the old style packet. The use of the first aid packets is discussed below.

Rules for Bandaging. Rules for bandaging are the result of experience and will assist in securing comfort, durability, and neatness. In addition, there will be greater ease in application, economy in time and materials, and a neat completed appearance.

Place the patient in a comfortable position. Place the injured part during this maneuver in the position in which it should remain after the application of the bandage.

Before applying a bandage to any part, see that it is clean.

Place cotton or other suitable dressing between opposing skin surfaces, i.e., between the fingers and toes, behind the ears, between the arms or body. The same principle is applicable where bandages or a cast may cause irritation from pressure.

Bandage from the extremity of the limb and work toward the trunk.

Hold the bandage firmly and avoid dropping it. Never allow the bandage to unwind excessively; use it gradually as needed, keeping the roll part uppermost.

Secure the bandage firmly by making at least two turns around the part, fixing the bandage by the second turn.

Bandage evenly and smoothly, neither too loose nor too tight. If too loose the bandage will not stay, and if too tight the circulation of the part may be impeded. Check the tip of the limb for color and warmth to make certain that the circulation is correct. Caution must be used over inflamed or painful areas. Children tolerate less pressure than adults. Be careful around the flexed portions of the limbs where the blood vessels are near the surface.

Avoid the use of excess bandage just to use it up. Extra turns increase pressure as well as heat and discomfort.

Secure a finished appearance by even overlapping and by placing the crosses and reverses in a straight line. Secure the last turn by tying or with a safety pin, or anchor with a clean piece of adhesive tape.

The use of the first aid packet should be well understood by each officer and soldier. Always use the first aid packet belonging to the injured soldier; your own may be needed later for yourself. Carefully remove the paper cover from the dressing without unfolding

the bandage or the pad and hold by grasping the outside rolls of bandage between the thumb and fingers of each hand, the back of the dressing toward you. The back of the dressing is marked by a piece of colored paper. Open the pad by pulling on the two rolls of bandage and apply the inner surface of the pad to the wound, still holding one roll of bandage in each hand. (See Plates 20 and 21.) Then wrap the bandages around the injured member and over the pad so as to prevent the dressing from slipping. Tie the ends of the bandage together or fasten with a safety pin. A second dressing may be applied over or next to the first, if needed. A head dressing is more difficult to apply than one on an arm or leg. Head bandages are kept from slipping by passing turns under the chin, behind the ears, over the crown, and by the use of safety pins.

WOUNDS

A wound is a breach of the skin or the flesh, or both, usually caused by external violence. The type of wound depends upon the shape and size of the injuring element. It may be described as a break in the continuity of any of the tissues of the body, but the term is commonly limited to the injuries of the skin, mucous membrane, and soft tissues.

Types of Wounds and Their Treatment. The types of wounds with respective treatment for each are as follows:

Incised wounds bleed freely, the amount depending on the region injured and the size and number of blood vessels cut. The margins of wounds of this type usually separate widely. They should be treated by checking hemorrhage (see hemorrhage), the removal of any foreign body, sterilization of the wound (iodine), and occluding of the margins. This latter may be accomplished by drawing the edges together by a firm bandage, by adhesive tape strips or sutures if these are available. In extensive wounds the part should be put at rest by slings or splints.

Lacerated or contused wounds are caused by blunt instruments and large heavy objects. The hemorrhage is usually slight since the vessels are torn irregularly across. Sometimes the vessels may be torn from their sheaths and can be seen pulsating on the surface. The injury is frequently so extensive as to cause the death of large areas of tissue. Shock is apt to be severe. These wounds must always be regarded as infected and should therefore never be closed. They should be packed open with sterile gauze and antiseptics, the hemorrhage controlled, the associated shock treated, and the part put at rest. Exposed vessels should be caught and ligated as they may open and bleed at any moment.

Punctured wounds are caused by penetrating instruments, from a pin to a bayonet or pick axe. The external opening may be small while internal injury, to arteries, nerves, and organs, may be severe. This type of wound is frequently infected since the drainage is not good. The treatment follows that already outlined for lacerated wounds.

Gunshot wounds vary with the character of the projectile. Military rifle and machine gun bullets have a very high muzzle velocity and tremendous striking power. At ranges under 500 yards, the effects on the soft tissues are frequently explosive. At longer ranges the wounds of entrance and exit may be drilled so clean as to be hardly noticeable and, escaping vital structures, very little damage may be caused. Shrapnel wounds are caused by lead shrapnel balls about the size of marbles. They are not ragged or sharp and are not so apt to carry portions of clothing deep into the wounds as high explosive. The severest forms of wound infections usually result from the introduction of dirty clothing into the tissues. High explosive wounds are particularly destructive. The shell particles are jagged and sharp and may do extensive damage after entering the body. The wound of entrance is usually small, much smaller than it would seem possible for the fragment to enter. The destruction of the deeper tissues may be very marked, and these wounds are usually infected. Pistol wounds are somewhat similar to shrapnel wounds.

The first aid treatment follows that given for other types of wounds, viz., application of the first aid dressings, control of hemorrhage, splinting the part, and the combating of shock.

In gunshot wounds of the joints the extremity should be splinted. Emergency operation may be required later to remove foreign bodies in the joint cavities. Wounds of the abdomen usually require early operation. Such cases should be given emergency treatment, receive nothing by mouth, and be moved promptly to the nearest hospital.

Extensive wounds of the chest are very serious. It is important to fill the defect in the

chest wall at once with ample dressings and packs. Unless the lung is promptly compressed and immobilized death may rapidly supervene from changes in intrathoracic pressure and mediastinal flutter with the production of paradoxical or pendulum breathing. When the chest cavity is opened by a wound air rushes in and destroys the intrapleural negative pressure on that side. When respiration is attempted the negative pressure in the good side sucks the mediastinum (the partition between the two lungs) toward that side and air rushes in through the wound in the chest wall of the injured side. As a consequence the good lung is compressed and is unable to get enough air through the trachea and bronchial tubes. When expiration occurs the reverse takes place. The force of expiration is not expended in squeezing air out of the good lung because it is lost by the shifting of the mediastinum into the bad side forcing air out of the wound. Instead of a firm bony cage we have a box, one side of which is flexible (the mediastinum), which shifts back and forth like a pendulum (hence pendulum breathing). Consequently air can neither get in or out of the good lung in sufficient quantity, and the injured person dies of asphyxia or heart failure from the violent motions of the mediastinum. The rule in gaping wounds of the chest is: *Plug the defect in the chest wall at once with whatever comes to hand.* Never mind sterility if no sterile supplies are available—use the man's shirt if nothing else is handy. But whatever you do fill the gaping chest wound at once.

Poisoned or infected wounds result from the stings of insects, the bites of snakes, wounds of poisoned darts or arrows, the bite of a rabid dog, or most commonly, the infection from micro-organisms.

Infected wounds seldom require first aid treatment except in unusual circumstances (isolated camps, exploring trips, etc.). In such instances the infected area should be opened widely and drained. Whenever there is any indication of infection of the skin, which is manifested by redness, inflammation, and tenderness on pressure upon the area involved, the application of a saturated solution of hot magnesium sulphate (Epsom salts) by means of soaking or the use of packs is recommended. It is the safest therapy and in most instances the best type of therapy for pyogenic infections. If the injury is on a leg or arm, immerse or pack the entire limb to include the thigh or upper arm. If Epsom salts are not available, use boric acid or ordinary table salt in saturated solutions.

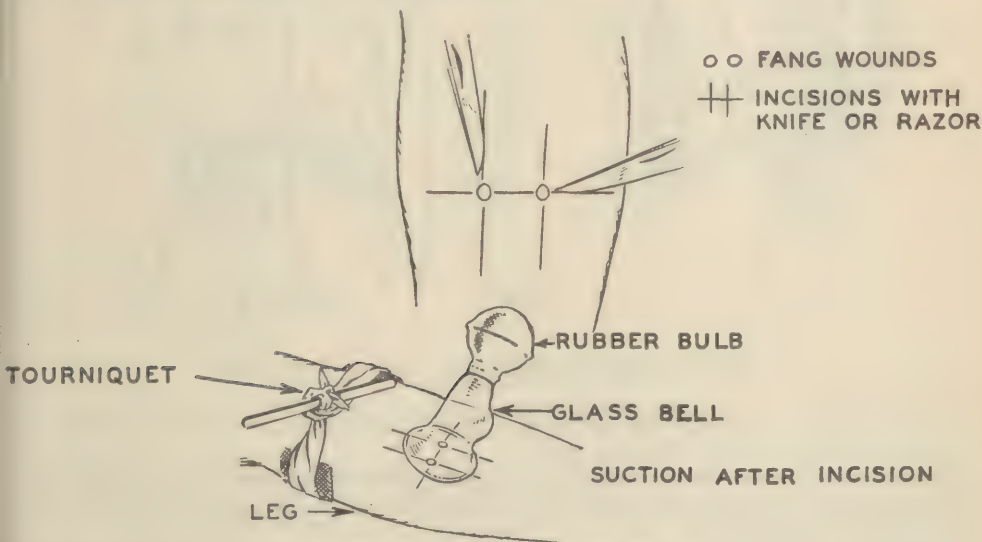


Plate 22. Treatment of Snake Bite.

Snake bite is a comparatively rare accident but requires prompt attention when it occurs, as the venom is very rapidly absorbed into the system. Apply a tourniquet close to the wound, on the side toward the heart. With a knife or razor blade, make a (H) cut through the fang marks (fang wounds), as shown in Plate 22, so that the wound will bleed freely.

If a suction apparatus is available suck out the wound with it. Otherwise suck the wound strongly and spit out the blood and poison; there is little danger in this to the person doing it unless he has cracks, sores, or cuts on the lips or in the mouth. Alcoholic liquors are not only useless but actually are harmful in the treatment of snake bite.

The bites of scorpions, poisonous spiders, and other poisonous insects are treated the same way as snake bites. Other insect bites may be painful but generally are not dangerous. Local applications of baking soda or ammonia may be helpful in controlling pain and swelling.

Dog bites may be dangerous. A person bitten by a mad dog or other rabid animal should be sent at once to a doctor for treatment. The rabid animal should not be killed at once but should be impounded and turned over to a veterinarian for observation and disposition. If unable to secure the services of a medical officer immediately, the following treatment is suggested: Careful, patient, and prolonged cleansing of the wound with water and soap and subsequent irrigation of the wound with warm salt solution. If the wound is so irregular or deep that all parts of the wound cannot be reached, the wound will have to be enlarged sufficiently to permit thorough cleansing. The regular Pasteur treatment is advised as a safety factor to combat any possibility of virus entering the deeper tissues. It should definitely be used where cleansing treatment has been delayed or inadequate.

Rules for First Aid Treatment of Wounds. Each type of wound may need some specific individual treatment, but there are some general rules which will aid the less experienced in giving proper first aid treatment to accidental wounds:



Plate 23. Improvised Slings for Injuries of the Arm.

Never touch the wound with anything unclean—dirty hands, non-sterile bandages, or anything dirty; severe infection may result.

Do not wash a wound with unsterile water. The wound is apt to be deeply infected by such attempts at cleansing. Treat the wound with iodine or any proper antiseptic. Use only one kind of antiseptic.

Expose the wound by cutting away the clothing if necessary. Avoid contaminating the wound with soiled clothes.

Apply first aid dressing and bandage firmly to control bleeding.

Support the injured part—a sling for the arm by the coat or shirt sleeve (Plate 23), a splint for the leg—if the wound is large.

Patients with contaminated wounds should receive antitetanic serum at the earliest opportunity. (Battalion aid station.) Before giving the antitetanic serum inquire from

the patient if he has ever been treated previously with any injection which included horse serum. If so, his treatment should be administered under the close supervision of a medical officer.

HEMORRHAGE

Hemorrhage, or bleeding, is the escaping of blood from the circulatory system such as occurs when a blood vessel is severed in a wound. The blood is a circulating fluid used as a vehicle to carry nourishment and remove wastes to and from all parts of the body. It is contained in a closed system of blood vessels, the arteries, capillaries, and veins, and is moved through the circulatory system by the pumping action of the heart. To accomplish its physiological function, the moving fluid is maintained at a slight pressure. If a large blood vessel is cut, especially a large artery, only the quickest and most accurate measures will prevent the injured person from bleeding to death in a few minutes.

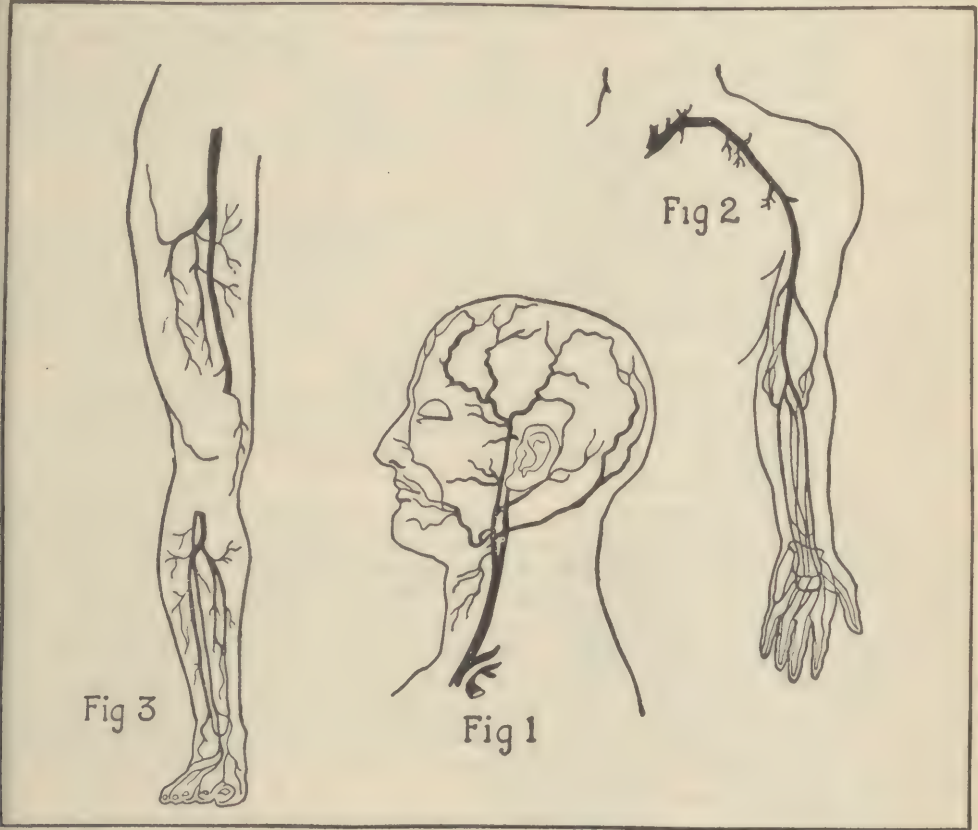


Plate 24. Locations of Main Arteries.

Types of Hemorrhage. Blood flowing from a cut artery comes out in jets or spurts and is bright red in color. This is *arterial* hemorrhage. The apparent color of the escaping blood is relatively unimportant as it is often mixed with the darker venous blood escaping from veins which were cut at the same time as the artery. The spurting is important and is unmistakable. Blood flowing from a cut vein comes out in a steady, comparatively slow stream. This is *venous* hemorrhage. Venous blood is darker in color than arterial blood. If only capillaries or small veins are cut the blood flows slowly or appears to ooze out.

Severity of Hemorrhage. While severity of bleeding cannot be accurately classified, the following is a very rough method for estimating the gravity of a given case of bleeding or hemorrhage:

If the *blood drips* from the wound the loss of blood is not likely to be serious, and the bleeding will probably stop very soon of its own accord.

If the *blood flows from the wound in a small, steady stream*, up to about twice the diameter of the lead in an ordinary pencil, or if spurting in a very small stream, the loss of blood should be looked upon with some concern but not with alarm. The bleeding will probably stop soon of its own accord or promptly upon the application of a dressing to the wound.

If the *blood flows from the wound in a large stream* (larger than that indicated above) or spurts in more than a very small stream, the loss of blood should be looked upon with considerable concern. Steady pressure to the wound or the more active and more elaborate measures for the arrest of hemorrhage will probably have to be used.

If the *blood flows or spurts in a relatively thick large stream* the situation is very serious and must be dealt with promptly and vigorously, including hand or tourniquet pressure over the main arterial trunk supplying the affected part.

Some parts of the body are more richly supplied with blood vessels than other parts; the head and face, the hands, and the feet are examples. (See Plate 24.) Even slight wounds affecting these parts of the body bleed profusely for a minute or two, but unless one of the larger vessels is cut the hemorrhage is usually not dangerous. The person rendering first aid in such cases must not be confused by the amount of blood deposited on the skin surface during the first few minutes of bleeding but must be guided by how much the wound itself is actually bleeding.

Effects of Hemorrhage. The effects of hemorrhage are twofold. One effect is a loss of the fluid elements of the blood and body. The total quantity of blood in the body is about 5 quarts. The loss of as much as one-fourth of this amount is very serious. The blood pressure drops and the body is dehydrated. This explains the extreme thirst caused by hemorrhage. Another effect is the loss of the red cells, which are the oxygen-carrying components of the blood. With the loss of these cells the supply of oxygen to the tissues is greatly diminished and serious consequences may arise.

Children and old persons are subject to severe hemorrhage, although children tend to recover quickly while the elderly do not. Bleeding which lasts over several days, even with a loss of large quantities of blood, seems to be tolerated better than a sudden extensive hemorrhage of a lesser amount.

Symptoms. The patient becomes very anemic; the tissues are shrunken as a result of the dehydration; the pulse increases in rate and the respirations become quick and sighing; the skin grows cold, clammy, and pale; and the patient feels faint, suffocated, and is very restless. There may be ringing in the ears and dimness or loss of vision together with fainting. Thirst is often excessive and the patient constantly calls for more water and air.

Methods of Controlling Hemorrhage. The body has only as much blood as it needs, and to lose some of its blood is detrimental. A small amount of blood can be lost without permanent injury to the body, but if a large amount is lost death results. Loss of blood is the thing most to be feared when an individual is first wounded, and the necessary measures must be taken to stop or greatly reduce this loss. The following are some of the simple methods of arresting hemorrhage:

Natural method. First, and probably the most important, the severed blood vessel has the remarkable power of natural or self-closure. The blood, immediately upon escaping into the air, coagulates or hardens, forming clots which plug the severed ends of the vessel. Ordinarily, by this natural method, the flow of blood from a wound will stop within three minutes.

The temporary arrest of arterial hemorrhage results from three factors: (1) *Coagulation of blood in and around the vessel.* If it were not for the ability of the blood to coagulate a person would bleed to death from the merest scratch. This may occur in hemophilia, a disease in which the coagulation of the blood takes place very slowly. Coagulation of the blood is influenced by many factors. Loss of blood tends to increase the coagulability of the blood. (2) *Weakening of the heart beat.* This results from an anemia of the brain centers and is a fortunate provision since it lessens the flow of blood and permits coagulation to occur. For this reason, stimulants should never be used until the bleeding has been,

properly controlled. (3) *Changes within the artery.* These consist of retraction of the elastic artery in its sheath, allowing a clot to form in the sheath, and contraction of the open mouth of the vessel allowing a clot to form within the lumen of the artery.

General pressure. The second method for arresting hemorrhage, and probably next in importance, is to place a pad or compress of gauze over the wound and secure it there with a bandage. If a bandage is not available the compress may be held in place by hand for about ten minutes. When the bleeding appears to have stopped leave the compress in place; if you remove it to inspect the wound you will probably dislodge the formed clots and start the wound bleeding again. Elevating the injured member also helps to stop the flow of blood.

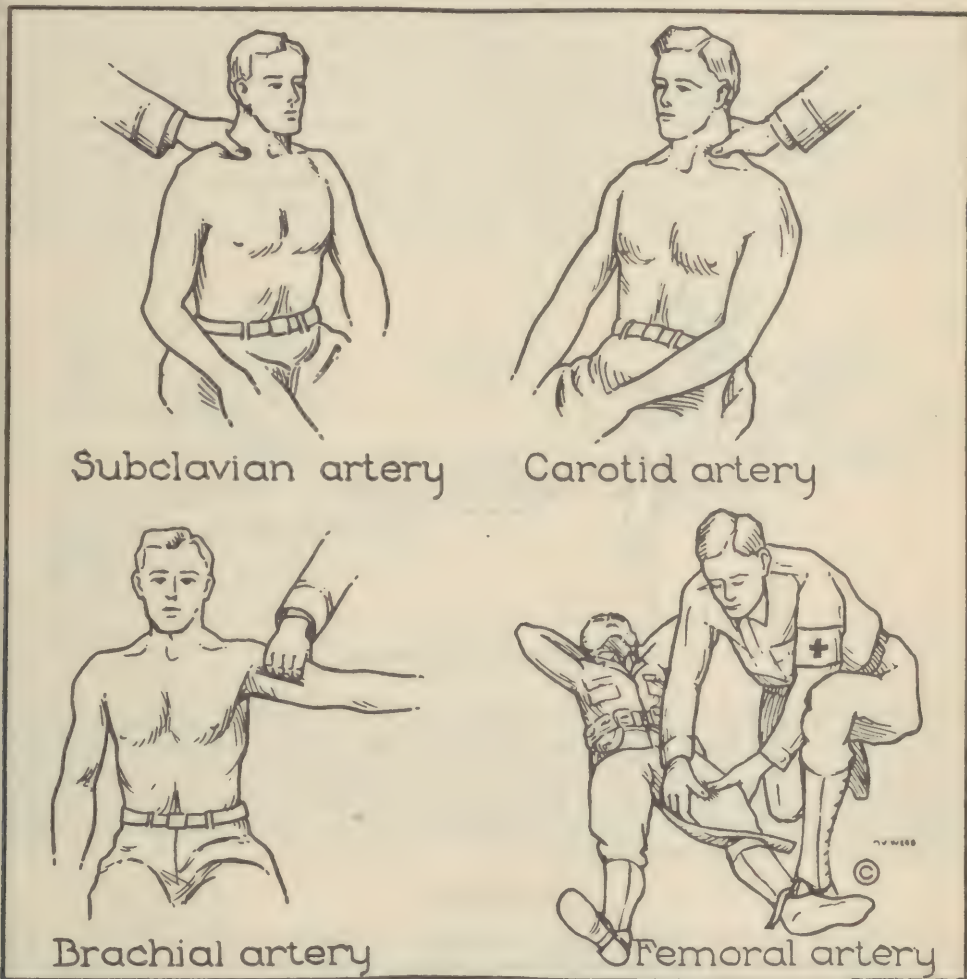


Plate 25. Checking Hemorrhage by Digital Compression.

Specific pressure. The third method for arresting hemorrhage is to shut off the flow of blood to the affected part by manual compression over the main vessels until a clot can form in the wound. The location and courses of the main arterial trunks are shown in Plate 24. The proper places to apply pressure to these trunks are shown in Plate 24. The effects of compression on the flow of blood from the wound should be carefully noted, so as to be sure the pressure is being exerted in the right place. Compression should be continuous for 10 to 15 minutes, after which it may be gently released, but again applied if the wound resumes bleeding.

The tourniquet. The fourth method for arresting hemorrhage is by the use of the tourniquet. The tourniquet is a mechanical device used instead of, or to replace, manual compression of a main arterial trunk. It consists of a firm pad and a tight band to hold the pad in place and press it down upon a large artery and so interrupt its flow of blood. Usually, a tourniquet will have to be improvised. The pad may be a tight wad of cloth, or some hard object, such as a block of wood or a smooth stone, wrapped in soft material. The band may be a handkerchief, necktie, belt, or similar article that will make a strong, flat band. A broad rubber band is more effective and less painful than non-elastic bands. The pad is placed over the area to which pressure is to be applied; the band is placed around the arm or leg, over the pad, and is tightened by hand or the assistance of a "twist." (See Plate 25.) The tourniquet is a most useful device, the prompt use of which has saved many lives. But in unskilled hands it is dangerous and should be used with the greatest caution. The most common abuses in using the tourniquet are: unnecessary, too tight, hidden, and left on too long. A tourniquet should never be used when its application is not necessary. It is quite common to see a misapplied or unnecessary tourniquet on an injured extremity that, instead of arresting hemorrhage, has the effect of preventing the natural stoppage of the bleeding. A tourniquet should never be tighter than necessary to check the bleeding; it is painful at best. Not oftener than every half hour, nor less often than once an hour, carefully and gradually loosen the tourniquet and note whether bleeding starts again. If it does, tighten the tourniquet again. A tourniquet



Plate 26. Use of Tourniquet.

should never be hidden by clothing or a bandage so that it might be overlooked or forgotten. Mark "Tourniquet" plainly on the patient's tag. If he is conscious, also caution him to tell medical attendants that he has on a tourniquet. He will usually not fail to do so. Remove the tourniquet as soon as its use becomes unnecessary to control the hemorrhage. If a tourniquet is left on continuously for as long as six hours the patient can be expected to lose the limb affected.

FRACTURES

A fracture is a broken bone, usually resulting from external violence. Fractures are very common injuries in war and in highway, industrial, and other accidents. They occur most frequently in the bones of the extremities.

Types of Fractures. There are two general classes of fractures; *simple* fractures, in which the skin is not punctured, and *compound* fractures, in which the skin is punctured by the bone itself or by the agent producing the fracture. (See Plate 27.) Fractures may be transverse, oblique, spiral, longitudinal, comminuted (several pieces), impacted, multiple (more than one fracture), and complicated (artery, nerve or soft tissues are damaged).

Symptoms of Fracture. Indications of fracture are:

Signs of local injury, such as pain, swelling, and bruising.

Abnormal mobility in the continuity of the bone.

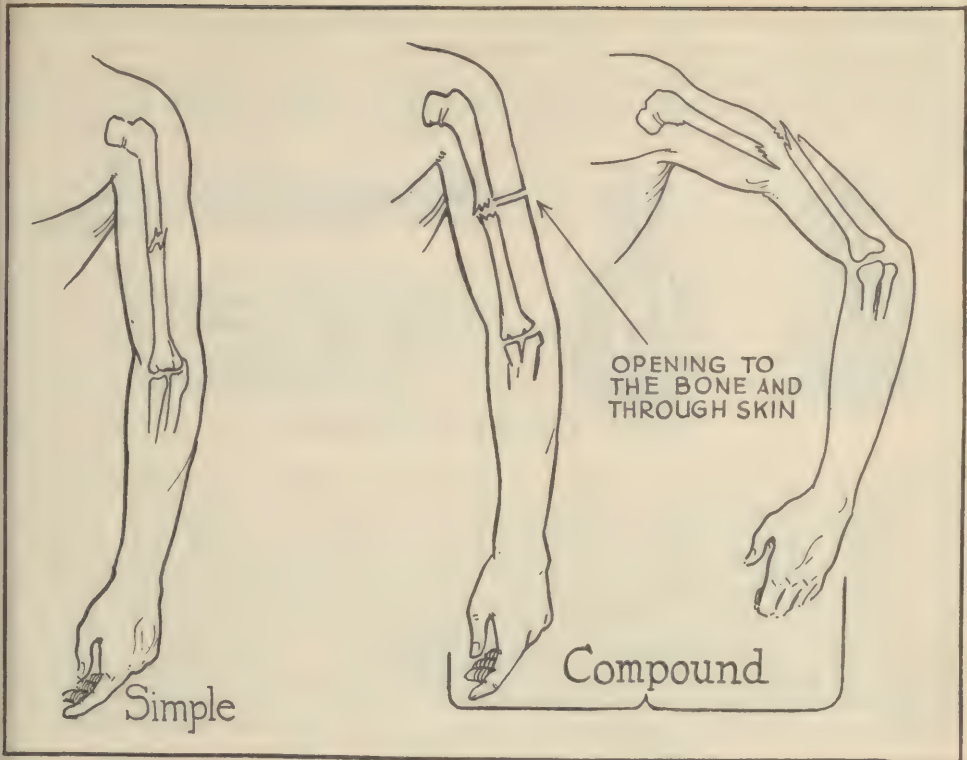


Plate 27. Types of Fractures.

Loss of function in the affected limb.
 Crepitus or grating of the bone ends.
 Deformity of the part.

First Aid Treatment of Fractures. The immediate danger in the case of fracture is that the sharp, jagged edge of the broken bone in moving about will lacerate the arteries, veins, nerves, and muscles or will perforate the skin and become compounded. Such trauma from the bone end adds greatly to shock and may, by severing large nerves, produce permanent paralysis. If a fracture becomes compounded the time of healing is greatly prolonged and frequently the usefulness of the limb or the life of the patient is endangered. Fractures, therefore, should be handled very gently, and patients should not be moved until well splinted and immobilized. In splinting a fracture the joints above and below the fracture should be included in the splint to secure the maximum immobility.



Plate 28. Principles of the Splint.

A *splint* is a piece of stiff or firm material, such as a board, limb of a tree, bayonet, thick magazine, or other suitable thing, to which the injured member is bound or bandaged so as to prevent movement of the bone fragments. The principles of the splint are illustrated in Plate 28.

"Splint him where he falls" is the keynote of the best first aid treatment of fractures. First, gently straighten out the limb to approximately its natural contour or appearance; generally, the easiest and best method is by a gentle, steady pull of the limb in the direction of its long axis. This is called "traction." The previously padded splint is then placed, further padded, and then bandaged at enough points to insure there will be no

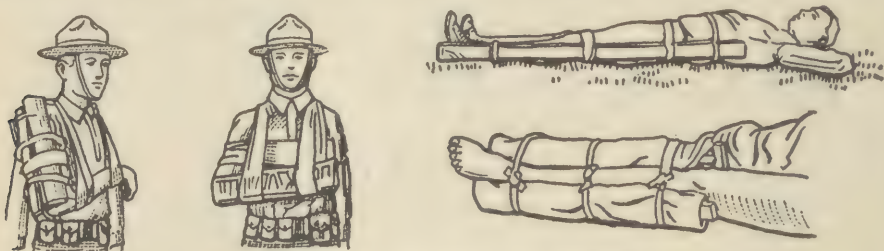


Plate 29. Types of First Aid Splinting.

movement of the broken bone. Padding should not be placed over the site of the fracture but above and below it. Splints must be long enough and stiff enough to accomplish their function. A very short or weak splint is useless and may even do harm. Bandages must be snug but not so tight as to interfere with the circulation of the blood. Never waste time trying to diagnose or "set" fractures as a part of first aid treatment. Even the medical officers do not try to make an accurate diagnosis or set fractures under such circumstances. If there is any doubt as to whether or not a bone is broken it should be splinted. Although the normal appearance of the limb has not been restored, nor the broken parts replaced in correct relative position, much has been accomplished in preventing further injury and in the relief of pain. Leave the rest to the medical officer.

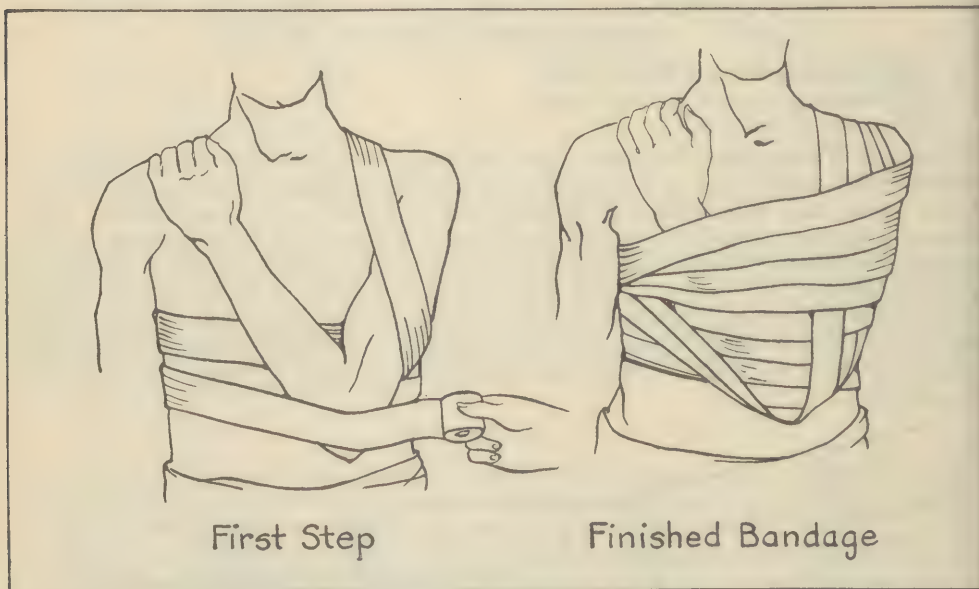


Plate 30. The Body as Splint for Fractured Arm or Collar Bone (Velpau's Bandage).

After hospitalization more elaborate traction splints or casts are applied to retain the proper apposition of the bone fragments. Plate 29 shows some of the more important types of improvised splinting.

Fracture of the Clavicle. Tie the shoulders back by means of a T-shaped splint or use a Velpau's bandage. (See Plate 30.) A sandbag or similar weight can be placed on the

tip of the affected shoulder unless it causes too much pain to the injured person during transportation. If used it should be anchored securely during transportation.

Fracture of the Upper Arm. Apply two splints, one in front, the other behind, if the lower part of the bone appears to be broken. If the fracture appears to be in the middle or in the upper part, apply one splint to the inner side and one to the outer side. Splints may be applied all around the arm. Support by a sling. (See Plates 18 and 23.) The broken arm may also be bound to the side of the body. If a hinged traction splint is available it should be used. (See Plate 31.) It permits the most comfortable transportation.

For fractures in the humerus near the elbow the Velpeau bandage may be used. It provides immobilization with flexion of the elbow.

Fracture of the Forearm. Place the forearm horizontally across the chest, thumb up; apply a splint to the inner side and one to the outer side of the forearm, both extending from the tips of the fingers to include the elbow joint. Support the forearm with a sling. In the absence of splint material the forearm may also be bound to the body. (See Plates 18, 23, 29, and 31.)

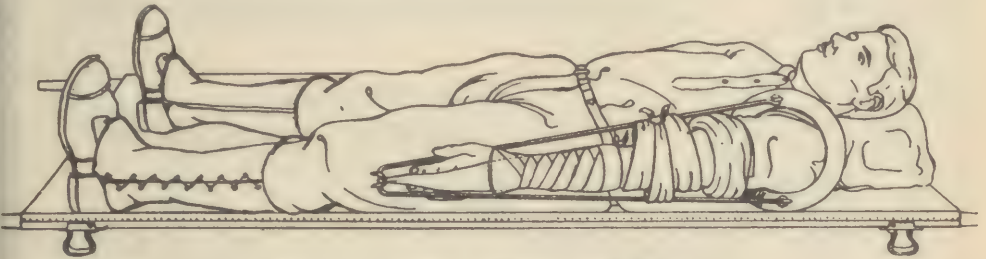


Plate 31. Hinged Traction Arm Splint.

Fracture of the Wrist (Colles' Fracture). Place the forearm and the palm of the hand on a splint that has a roller bandage or similar enlargement on one end for the palm of the hand. The fracture can usually be reduced by grasping the hand of the patient with your opposite hand as in a handshake; then, aided by your other hand on the patient's forearm, exert steady traction until the wrist is straight. After reduction maintain the traction until the splint above mentioned is applied, securing it firmly but not too tightly by roller bandage. Check the finger tips to insure proper circulation after application of the splint. Support the forearm with a sling.

Fracture of the Hand. Bandage the hand over a roll of bandage placed in the palm. Support the hand with a sling.

Fracture of the Ribs. Firmly strap the affected side with adhesive tape, extending over the mid-line back and front. If adhesive tape is not available, use roller or muslin bandage going around the chest.

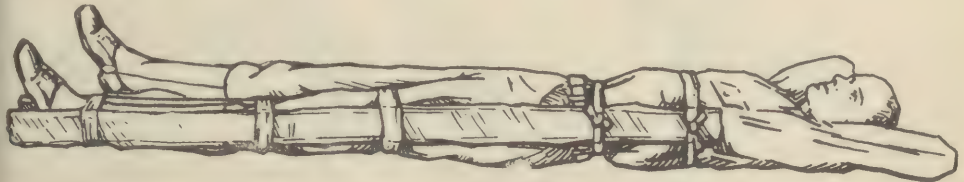


Plate 32. Improvised Splint for Fractured Pelvis.

Fracture of the Spine. Extreme care must be used in handling back injuries; when the spinal cord is involved paralysis is present and injudicious handling may increase the injury to the cord. The patient should not be moved until a litter or board has been procured. The door of a house is an adequate splint for transportation. Bring the splint to the patient, place him on it with utmost care, sliding the door under him and taking

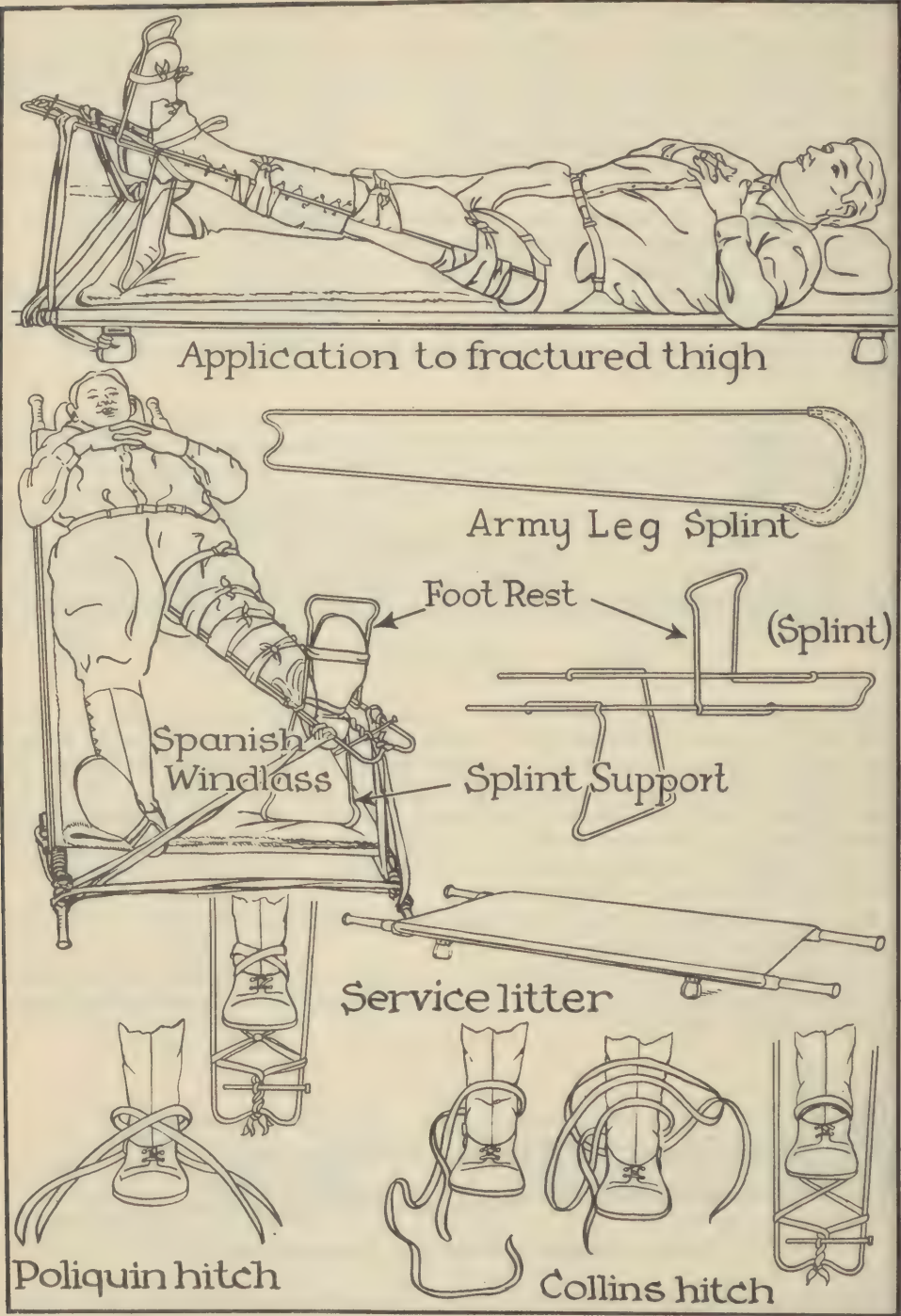


Plate 33. Use of the Hinged Half-ring Army Leg Splint for Fractured Thigh.

precautions not to move or bend the spine (lift patient flat, face down). Then transport him, face down, to the nearest medical installation with minimum changes of position.

Fracture of the Pelvis. The best method of transportation support for pelvic fractures is the use of a hammock type of sling. If the fracture involves the *acetabulum*, the splint should include the thigh of the affected side. (See Plate 32.)

Fracture of the Thigh. Apply a long splint on the outer side extending from the arm pit to beyond the foot, and another splint on the inner side extending from the crotch to beyond the foot (See Plate 32). The injured leg can be bound to the sound one if splint material is not available. It should be noted in this as well as in the first aid treatment of fractures of other long bones that an effort is made to immobilize the joint above and the joint below the fracture. If necessary equipment is available the Army hinged half-ring leg splint should be applied. It may also be used for fractures of the lower leg (See Plate 33). Application of the Army hinged half-ring leg splint is described in the section "Training in First Aid Subjects."

Fracture of the Lower Leg. Apply two splints, one on the inside and one on the outside, each extending from above the knee to beyond the foot (See Plates 33 and 34). Many other improvised splints can be used for fractures of the leg, such as a bayonet, a rifle, a blanket roll, a pillow, or binding the injured limb to the other leg.

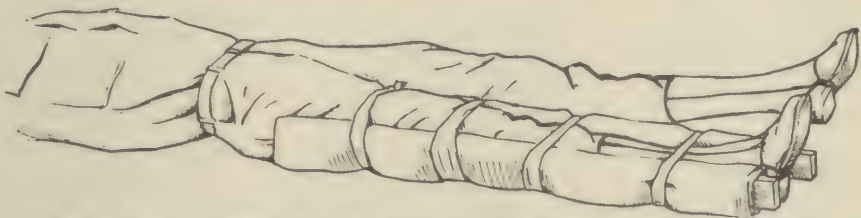


Plate 34. Use of Blanket Roll as Improvised Splint for Fractured Leg.

Treatment of Compound Fractures. The fracture itself is given the same type of first aid treatment as outlined in the case of simple fractures. The complicating wound and bleeding are treated aseptically and a bandage applied before application of the splint. The three different things which have to be given treatment at practically the same time are: bleeding, wound, and fracture.

The principal *precautions* to be observed in dealing with compound fractures are:

Handle with the greatest gentleness.

Use the utmost surgical cleanliness possible.

Do not try to do too much.

SPRAINS AND DISLOCATIONS

Two types of injuries which are closely related and often confused with fractures are sprains and dislocations. They are also caused by external violence directly or indirectly to the affected part of the body. Either may accompany fractures.

Sprain. A sprain is a tearing or stretching of the ligaments of a joint or of the tendons of muscles that insert close to the joint. It should be treated by putting the affected member at rest and by application of cold packs when practicable to limit the effusion and swelling about the joint. Avoid bandaging too tightly at first as swelling may impair the blood supply and cause damage. When the swelling has subsided, the application of hot compresses may be used to increase circulation and stimulate healing. Strength of the joint can then be increased by the use of adhesive plaster strapping to limit the motion of the joint during early convalescence. (See Plate 35.)

Dislocation (Subluxation). A dislocation is a condition in which the articular surfaces of bones are partially or completely separated from one another.

In *dislocation of the jaw* the mouth is held wide open and cannot be closed. Treat by padding your thumbs, then pressing downward and backward against the lower molar teeth until the *mandibular condyle* is free and snaps back into place. Do not persist in

reducing the dislocation as a first aid measure but secure the services of a medical or dental officer.

In *dislocation of the shoulder* the top of the shoulder is hollow and not rounded out as on the opposite side; the elbow sticks out from the side and when the affected hand is placed on the opposite shoulder the elbow cannot be brought against the chest. If reduction is attempted it should be done very gently. Occasionally, careful manipulation or traction with the heel (without shoes) of the operator in the *axilla* will slip the bone into place. If not, an anesthetic is required and Kocher's method may be tried. This consists of grasping the elbow with one hand and the wrist with the other while the patient is recumbent. Pull gently to get slight extension; *rotate* the arm firmly and steadily *outward* as far as it will go with the elbow pressed to the side. Next draw the elbow steadily *forward* and *upward* as far as it will go with the arm still rotated outward. Finally, bring the hand across the front of the chest and place on the tip of the opposite shoulder while the elbow is drawn across and brought against the chest. The arm should then be bandaged to the side.



Plate 35. Adhesive Strapping of the Ankle for Sprain.

Backward *dislocation of the elbow* is the most frequent. The joint cannot be moved; it is in a semiflexed position and the displaced bones project prominently behind. To reduce, place the knee in the bend of the elbow, pull the arm forward against the knee and slowly and forcibly bend the forearm to a right angle. It is bandaged in this position. Do not be rough and in case of doubt do not attempt reduction.

Dislocation of a finger is usually reduced easily by gentle steady traction on the affected finger. The patient should be seated or recumbent during the manipulation to fix his position and make traction steady.

Other dislocation of joints may occur, some of which involve the *wrist, hip, knee, and ankle*. Dislocations of the knee are reduced without much difficulty by flexing the thigh and traction and manipulation of the knee joint, pushing the bones in place. The knee must be splinted afterwards. Frequent dislocation of one or more of the semilunar cartilages of the knee joint will require operation, tightening the ligaments or removing the cartilages to secure permanent cure. Dislocations of the wrist and hip are rare. Dislocation of the ankle requires surgical procedure for correction.

TRANSPORTATION OF THE SICK AND WOUNDED

Severely injured or seriously sick persons should be carried on a litter whenever possible; it is usually better to let them lie until suitable transportation is available. Severely wounded soldiers, or those suffering from wounds and shock, should be carried on the service litter.

Manual Transport. Lacking a litter, the injured or sick who are unable to walk may be moved short distances without the aid of a litter. Patients not too seriously wounded

may be assisted in walking, or be carried by one man. If the litter bearer has no assistant he proceeds as follows; turn the patient on his face, step astride his body facing his head; place hands under his armpits and raise him to his knees; clasp him around the waist and raise him to his feet (Plate 37, Figs. 1-4). If he is conscious and can walk with assistance, seize his left wrist with your left hand and draw his left arm around your neck. Support him with the right arm around his body, his left side resting against bearer's body. (See Plate 36.) This method is known as the "supporting carry." It cannot be used with an unconscious person.

To carry "by arms carry," proceed as in last case in raising him to the erect position, then pick him up as shown in Plate 36.



Fig. 1. The "Supporting Carry."

Fig. 2. The "Arms Carry."

Fig. 3. The "Straddle-back Carry."

Plate 36. Manual Transport of Wounded by One-Man Carry.

The easiest method of one man carry is by the "Fireman's Carry." Raise the patient to his feet as previously described. While supporting him erect pass around to facing him. Grasp his right wrist with the left hand and pull upward; stoop and pass the right arm between his legs, at the same time drawing him across the (bearer's) left shoulder. Pass the patient's right wrist to bearer's right hand, reach back and grasp his left wrist with the left hand and draw patient's left arm around to steady him. The various steps from lying on the ground to the completed "carry" are shown in Plate 37. This method can be used to carry an unconscious person as well as a conscious one.

In the "straddle-back carry" raise the patient to his feet as previously described, step in front of him, back to patient, stoop and grasp his thighs, rise to position shown in Plate 36, bringing the patient well up on the back. This method cannot be used except with the assistance of the patient.

The usual method of a two-man carry is shown in Plate 38, Fig. 1, and is self explanatory. Serious injury to the arms or legs may preclude the use of this method.

A seriously wounded man may be carried in a recumbent posture by two-man carry as shown in Plate 38, Fig. 2. Both bearers must be on the same side of the patient. He should be carried well up on the chests of the bearers.



Plate 37. Fireman's Carry.

Transport by Litter. Usually the wounded man should be laid on his back on the litter, his limbs naturally disposed. "Bring the litter to the patient, and not the patient to the litter." Tight clothing, especially collars and belts, should be loosened. Clothing may be cut to inspect and treat his injuries but should not be pulled so as to disturb the patient. Do not remove clothing, as it is needed to retain warmth; cover the patient with a blanket or overcoat. The injured nearly always asks for water; give him liquids, preferable hot, unless the wound is in the abdomen. Do not give him liquor. He should be properly prepared for his journey so that he need not again be disturbed until he reaches the aid station. A patient having once been placed on a litter should not be removed from it until he reaches the hospital.

Improvised litters. In the absence of a service litter, one may be improvised out of poles supporting a bed. The bed may be a blanket, overcoat, shelter tent, bedtick, poncho, bags, chicken wire, or other suitable article or material. It is best to form a framework by lashing two short poles across the ends of the long ones to keep them apart. The long poles should be about 7 feet, the short ones about 3 feet in length. An ordinary camp cot makes a very satisfactory litter.

Adjuncts to the Litter. Every effort should be made to minimize the task of the litter bearers since the *critical point* in the chain of evacuation, within the division, lies between the casualty on the field and the most forward ambulance. The use of advanced ambulance posts and mechanical devices which will aid the litter bearers and accelerate the evacuation is recommended and employed when feasible.

The *wheeled litter carrier* is such a mechanical aid. (See Plate 39.) It is a collapsible, two-wheeled cart, capable of transporting one loaded litter. When employing the carrier over suitable terrain, the litter squad may be reduced to two men and yet be able to perform the same task with increased rapidity and less fatigue (FM 8-35).



Fig. 1. The Saddle-back Carry.



Fig. 2. The Arms Carry.

Plate 38. Manual Transport of Wounded by Two Bearers.

The *Cacolet* is a mechanical device used for transportation of patients upon an animal. There are two common types of cacolet, known as the Carlisle Cacolet and the 1st Cavalry Division Cacolet. Both are fitted to the Phillips' pack saddle, the former for two patients and the latter for one. For details of these devices see FM 8-35.

Horseback. The help required to mount a disabled man will depend on the site and nature of his injury; in many cases he is able to help himself materially. The horse, blindfolded if necessary, is to be held by an attendant.



Plate 39. The Wheeled Litter Carrier.



Fig. 1. 1st Division Cacolet.

Fig. 2. Carlisle Cacolet.

Plate 40. Transport of Patients by Cacolet.

To load, the patient is placed on the horse from the near side. The patient having been lifted is carried to the horse, patient's body parallel to that of the horse and close to its side, his head toward the horse's tail. He is then raised and carried carefully over the horse until his seat reaches the saddle, when he is lifted into position. One man goes to the off side and puts the patient's right foot into the stirrup. One man puts the left foot in the stirrup. (See Plate 41.)

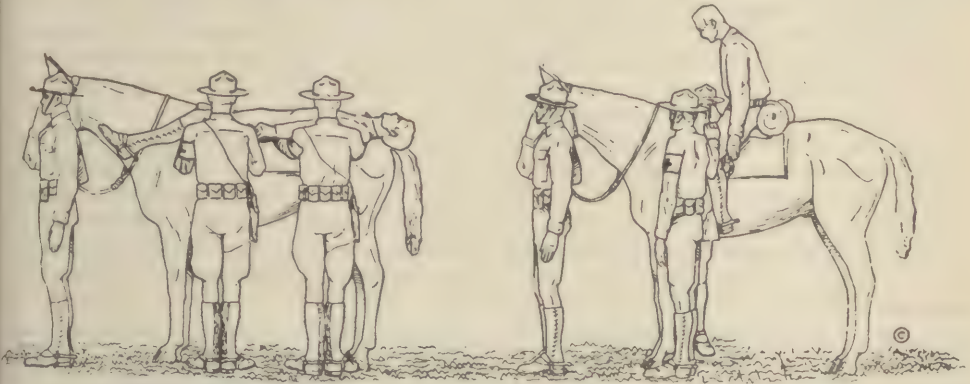


Plate 41. Placing Wounded on a Horse and Carrying on Horseback.

To unload, the patient's feet are disengaged from the stirrup and his right leg swung over the pommel, one man going to the off side for the purpose and then resuming his post at the left side. The patient is brought to a horizontal position, gently lifted over the saddle and carried backward until free of the horse, and lowered to the ground.

The patient, when mounted, should be made as safe and comfortable as possible. A comrade may be mounted behind him and guide the horse, otherwise a lean-back may be provided, made of a blanket roll, a pillow, or a bag filled with leaves or grass. If the patient be very weak the lean-back may be made of a sapling, bent into an arch over the cantle of the saddle, its end securely fastened, or some other framework to which the patient is bound.



Plate 42. Carrying Wounded on Travois.

The Travois. The *travois* is a vehicle intended for transporting the sick and wounded when the use of wheeled vehicles or other means of transportation is impracticable. It consists of two long poles, one end of each pole being attached like shafts to the side of a horse, the free end dragging on the ground. Behind the horse, cross bars extend between these poles, holding them parallel and affording support for a patient. (See Plate 42.)

A travois may be improvised by cutting poles about sixteen feet long and two inches in diameter at the small end. These poles are laid parallel to each other, large ends to the front and $2\frac{1}{2}$ feet apart; the small ends about three feet apart, and one of them project-

ing eight or ten inches beyond the other. The poles are connected by a crossbar about six feet from the front ends and another about six feet back of the first, each notched at its ends and firmly lashed at its notches to the poles. Between the cross pieces the litter bed, six feet long, is filled with canvas or a blanket which is securely fastened to the poles and cross-bars, or filled with rope, lariat, or rawhide strips, stretching obliquely from pole to pole in many turns, crossing each other to form the basis for a light mattress or an improvised bed; or a litter may be made fast between the poles to answer the same purpose. The front ends of the poles are then securely fastened to the saddle of the animal. A breast strap and traces should, if possible, be improvised and fitted to the horse. On the march the bearers should be ready to lift the rear end of the travois when passing over obstacles, crossing streams, or going uphill.

Precaution. There is one definite precaution or consideration which must be kept in mind before transporting a sick or wounded person: "Will transportation be detrimental to the patient to such an extent that he may lose his life or be permanently disabled therefrom?" Often the necessary treatment must be given at the site where the accident occurred in order to prepare the patient for transportation. The time required and the factors involved are dependent upon the weather, nature of the terrain, facilities for treatment, and the condition of the patient.

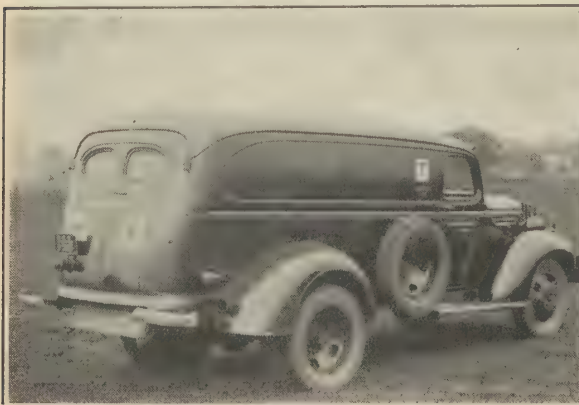


Figure 1. Side view



Figure 2. Rear view

Plate 43. An Army Ambulance.

Ambulance Transportation. There are various types of ambulances used in the military service: the metropolitan ambulance (general hospitals in the zone of the interior) and the motor field ambulance (station hospitals) the cross-country, 4-wheel drive, motor field ambulance; the four-animal drawn ambulance; and the two-animal drawn ambulance. The ambulance conforms in principal to the passenger automobile, affording the maximum degree of riding comfort for distant transportation of the sick and wounded. (See Plate 43.) Care should be taken in the loading and unloading of patients from the ambulance to keep the patient level and to make all movements without jerking. The speed the ambulance may be driven depends upon the condition of the ground or roads over which it is driven.

If an ambulance is not available, a cot or litter may be suspended from the top of an Army truck. Someone must remain near the litter to prevent horizontal sway. If the truck has no top beams, cover the truck bottom with straw or grass before placing the litter thereon.

FIRST AID IN COMMON EMERGENCIES

Some types of accidents occur more frequently in civil life than in the Army, and every person should know the principal signs or symptoms of common injuries and the simple first aid measures useful in their immediate care. The measures to be taken are all very simple and are usually effective. It is well for the layman to wish to aid those who have

met with an accident, but he must apply the correct actions because the wrong thing may harm the injured person instead of helping him. In case of doubt as to what to do, there is one important rule: Secure at once the services of a doctor. While waiting for his arrival measures should be taken to assist the patient in being comfortable.

Shock. Shock is a condition of extremely depressed or lowered vitality, usually the result of a severe wound or injury but also caused from such conditions as fear, poisoning by chemicals, excessive heat, lack of nutrition, and hemorrhage from other causes than external injuries. The degree of shock is usually greater in the old, the weak, or poorly nourished, the physically exhausted, or individuals with a highly impressionable nervous system.

Shock is quite easily recognized. Its principal symptoms include: pallor of the skin; a cold sweat especially on the forehead; an anxious, frightened expression; sighing or irregular breathing; weak and irregular pulse; body temperature below normal (cold and clammy); and sometimes nausea and vomiting. The patient may become unconscious.

The earliest first aid measures in severe injuries should always include anti-shock treatment, even though symptoms of shock may not have appeared. Following are the principal first aid measures to be taken to prevent, or combat, shock.

Make the patient as comfortable as possible, usually on his back, limbs straightened out, head slightly raised, clothing loosened. Arrest hemorrhage (bleeding); reduce pain; dress wounds; splint fractures. If practicable move him to a warm room. In any event keep him warm and dry. Use blankets or clothing and hot water bottles, canteens filled with hot water, or some other source of external heat. Be careful to avoid burning him, as the victim of shock will often be too depressed to notice that he is being burned. Unless his injury is in the chest or abdomen give him hot drinks. Keep him perfectly quiet and let him rest and sleep. In mild cases of shock, warmth and quiet are sufficient. In severe cases, however, active measures must be carried out as promptly as facilities will permit; death frequently follows inadequate anti-shock treatment.

Pain in the Abdomen. Pain in the abdomen may be due to a variety of causes, many of which may be serious. In any case where there is nausea and vomiting, accompanying or following pain over all or any part of the abdomen and with pain and tenderness in the lower right part of the abdomen, appendicitis should be suspected. Appendicitis may also occur without nausea. Always put suspected cases to bed and call a medical officer. As a general working rule, *never give cases with abdominal pain or tenderness food, water, a laxative, or an enema unless ordered to do so by a medical officer.*

Fainting. Except as a symptom of severe shock this condition is seldom dangerous. Lay the patient on his back with the head lower than the rest of the body if practicable, loosen clothing, give plenty of fresh air, and give stimulants (when consciousness is regained) carefully and slowly. A cold compress on the head is beneficial; it is usually placed on the forehead or the back of the neck. Sprinkling cold water on the head and face can be done in lieu of a compress. The arms and legs may be rubbed, rubbing from the hands or feet toward the body. Aromatic spirits of ammonia inhaled or taken by mouth in small doses are considered useful.

Concussion of the Brain. Concussion of the brain is a shock to the brain caused by abrupt violent force against the skull, injuring the brain but with insufficient force to fracture the skull. The patient is pale and weak, always dazed and sometimes unconscious. He should be examined carefully for evidences of fractured skull—bleeding from the internal ears, bleeding or escape of cerebro-spinal fluid from the nose or mouth, evidences of paralysis of eye muscles, face, or extremities. Treat as you would for shock.

Compression of the Brain and Fractured Skull. This is a much more serious condition than the above. If the compression is due to hemorrhage from the arteries of the dura (middle meningeal) there is usually immediate unconsciousness following the injury, followed by return to consciousness. This in turn gives way to a gradually increasing stupor with symptoms of slowly developing paralysis. Operation (subtemporal decompression) is the treatment required. First aid treatment mostly consists in keeping the patient quiet and treating for shock.

Fractures of the base of the skull can usually be recognized by bleeding and escape of cerebro-spinal fluid, from the ears and nose, together with paralysis of the various cranial nerves (eyes, face) or of the limbs. There is usually compression of the brain which is evidenced by a rising blood pressure, a slow and falling pulse, and slow breathing. These cases should be kept quiet and treated for shock. A rising blood pressure and gradually slowing pulse, particularly if the compression can be localized by areas of paralysis, calls for a decompression of the brain. Lumbar punctures to relieve pressure may be performed.

Apoplexy. This is due to a rupture of a blood vessel in the brain. It seldom occurs below the age of 50. The patient suddenly falls, is usually unconscious, and is paralyzed. Paralysis of the face may be recognized by a drooping of the corner of the mouth on that side and a smoothing of the wrinkles. If an arm or leg is paralyzed it falls quickly and heavily when dropped on the bed while the opposite arm drops a little less heavily (even if the patient is unconscious), due to muscular elasticity. The treatment consists of rest and quiet. No stimulation should be given at first lest the bleeding be increased.

Epileptic Convulsions. In epilepsy, a nervous disorder, there is very little warning of an approaching convulsion. The individual usually cries out and immediately falls in a severe convulsive fit. The limbs stiffen out for a few moments and then clonic contractions usually begin in the extremities, followed by foaming at the mouth and complete unconsciousness. Nothing can be done to avert the fit. The only treatment is to prevent the patient from injuring himself in the fall or in his convulsive movements. The tongue is frequently severely bitten. To prevent this it is well to pad a spoon handle, tongue depressor, rolled towel, clothes pin, or the like and insert between the teeth during the attack. Do not try to hold the patient in his struggles but place him on a mattress or other soft object to prevent his injuring his head or limbs by striking them against a hard object. After the convulsions the patient may remain unconscious from a few minutes to several hours, appearing as though in a deep sleep. The pulse should be checked to note the general condition of the person afflicted; this will also assist in differentiating epilepsy from other conditions. After the convulsions cease, inspection of the tongue for possible injury and the presence of a foamy substance in the mouth will often determine the diagnosis. If the patient is questioned after awakening he will usually admit a history of previous attacks.

Unconsciousness. Unconsciousness may result from any one of a number of causes, the more common ones being: fainting, head injury, concussion of the brain, severe alcoholic intoxication, apoplexy, epilepsy, diabetes, chronic kidney disease (uremia), wound shock, electric shock, toxemia, and thermal accidents. In cases where the type and cause of the unconscious state are unknown, and the unconsciousness persists for more than a few minutes, send for a doctor; place the patient in a comfortable position, the head level with or below the body, the limbs naturally disposed; loosen tight clothing; give the patient plenty of air; keep him quiet; and isolate him from all persons not actually needed to help him. *Never attempt to give liquids to an unconscious person.*

Asphyxiation. Asphyxiation is a condition of unconsciousness due to suffocation or interference of any kind with the oxygenation of the blood. Several causes of asphyxia are as follows:

Mechanical obstruction preventing air from reaching the lungs.

Strangling external pressure on the respiratory passages.

Foreign bodies in the respiratory passages of sufficient size to embarrass respiration.

Water or fluids (edema) in the respiratory passages, such as occurs in drowning or diseases of the larynx.

Inflammation and swelling of the throat or the presence of an obstructive membrane as in diphtheria.

Weakness or spasm of the respiratory muscles.

Whooping cough, poliomyelitis, paralysis of the upper part of the spinal cord, and convulsions.

Dysfunction of the respiratory center of the medulla.

Degenerative cardio-reno-vascular diseases or heart failure.

Inhalation of smokes and poisonous gases.

Sufficient inhaled concentrations of irritating or toxic smokes, illuminating gases (carbon-monoxide), gasoline motor exhaust fumes, ammonia fumes, and war gas fumes.

The treatment of asphyxiation depends upon its cause. However, in the majority of the cases, artificial respiration is most commonly used. The cause must be removed before artificial respiration will be able to restore respiration. The pulmotor or other mechanical means of artificial respiration should be used by experienced operators only and with due consideration of the condition of the respiratory tissues.

Artificial Respiration. Artificial respiration is the assisting of or starting of respiration in a person in whom it has ceased (the new-born is an exception). The methods used must supplement the respiratory apparatus of the individual involved. It is one of the most important procedures a first aid operator should know how to administer. There are several known methods: Schäfer, Sylvester, Howard, Laborde, and the mechanical respirators.

The Schäfer method. Experience has indicated that the Schäfer method is the most commonly used because it is easiest to administer and has proven to be the most effective and least injurious first aid measure. Mechanical respirators are not usually available immediately. Schäfer describes it as follows:



Plate 44. The Schafer Method of Artificial Respiration.

"It consists in laying the subject in the prone posture, preferably on the ground, with a thick folded garment underneath the chest and epigastrium. The operator puts himself athwart or at the side of the subject, facing his head, and places his hands on each side over the lower part of the back (lowest ribs). He then slowly throws the weight of his body forward to bear upon his own arms, and thus presses upon the thorax of the subject and forces air out of the lungs. This being effected, he gradually relaxes the pressure by bringing his own body up again to a more erect position, but without moving the hands."

The movements are repeated regularly and should average about twelve to fifteen per minute, therefore requiring about 5 seconds for each manipulation. To avoid too rapid procedure the use of the following words are advocated. As pressure begins on

the chest say, "One thousand one, one thousand two, one thousand three," at the end of which release the pressure; withhold the pressure but hold the hands on the back while you repeat, "One thousand one, one thousand two," at the end of which reapply the pressure slowly, throwing the weight of the body forward on your arms. If the patient is small and you are large, be careful that you do not injure the patient by using all your weight for pressure. Continue your efforts to revive the patient for an hour or more. The pressure should be extended downward and forward, thereby simulating the function of the lower respiratory muscles and diaphragm. Do not give up, but persist until a doctor appears. He can determine by examination if your further efforts will restore life.

Drowning. A person suffering from submersion is commonly spoken of as having been "drowned." It should never be assumed that the person removed from the water is *dead* unless he is definitely known to have been submerged for a long time. No time limit of submersion can be given because it varies with the individual case. Also, to excited eye-witnesses a few seconds, let alone a couple of minutes, seem like hours. The



Plate 45. First Step in the Resuscitation of the Drowned.

"drowned" person has stopped breathing and to resuscitate him his breathing must be started by artificial means. As soon as the victim is out of the water turn him face downward, step astride him, and grasping him around the body near the hips lift him so that his head and chest hang well down; hold him in that position for at least 15 or 20 seconds to allow the water to drain out of his air passages. Then start artificial respiration at once, on the ground or in a boat. Do not waste time in removing clothing, seeking signs of heart action (life), or removing the patient to a more convenient spot. Continue the artificial respiration until he breathes well of his own accord, or until quite sure the case is hopeless. Either circumstance may require from an hour to three hours of artificial respiration. After he begins to breathe, watch carefully to see that he does not stop, assisting him if necessary. A dry feather or a mirror held in front of the patient's nose will indicate whether artificial respiration is actually being produced, and will also show when the patient begins to breathe naturally. External heat may be applied while the resuscitation efforts are being made, taking care not to burn him. Do not attempt to give him liquids of any kind until he is conscious; then give stimulants and keep him warm. Make no attempt to move him until he is breathing naturally.

Prevention of drowning accidents. Most drownings occur when people go swimming. By observing the following simple ten commandments most of such accidents will be prevented:

Don't swim immediately after eating; wait at least two hours.

Don't go swimming alone unless you are an expert.

Don't swim if overheated.

Don't swim if you know you have heart trouble.

Don't continue swimming when exhausted.

Don't wade into water with your hands above your head; you may step into a hole and you should be ready to stroke.

Don't struggle if caught in a swift current or undertow; the force of the current will bring you to the surface.

Don't fight or struggle if you "swallow water"; clear your windpipe of water first.

Don't cry for help in fun; you may really need it some time.

Don't dive without knowing the depth of the water.

War Gas Poisoning. Symptoms from gas in chemical warfare and the treatment of gas casualties are discussed in Chapter VIII.

Choking. A person being suffocated by a substance lodged in his windpipe (usually food) gasps for air, clutches at his throat, and may cough violently. His face turns blue, and he exhibits great fear. Prompt removal of the foreign body is necessary or death will ensue, unless the supply of air reaching the lungs is sufficient for life. Have a doctor called at once, telling him the circumstances briefly so that he may bring the proper instruments. Cause the patient to cough and slap him violently on the back between the shoulder blades. If this is insufficient, hold him with his head and chest down and again slap him on the back. Sometimes a foreign body lodged in the throat can be removed by inserting a finger into the throat, dislodging the object. The patient may then cough it out.

Alcoholic Intoxication. Alcoholic intoxication is a condition in which there is a varying degree of unconsciousness which results from imbibing an excess of alcoholic liquids. A person unconscious from alcoholic intoxication is "dead drunk." In severe alcoholism the face is flushed, eyes are red and bloodshot, pupils dilated, breathing slow and regular, and the breath is heavy with the odor of alcohol. Voluntary movements are usually uncoordinated. The individual may be stuporous or unconscious; if so, he can be aroused but quickly returns to his stupor or unconsciousness. The most important thing to be remembered about alcoholism is the possibility that the unconscious state may be due to some other cause even though there is an odor of alcohol. Ordinarily, alcoholism does not require any particular treatment. Vomiting may remove some of the alcohol from the stomach; it may be induced by having the patient drink copiously of warm salt water or mustard water. A cup or two of strong, black coffee, or one-half to one teaspoonful of aromatic spirits of ammonia in water, are useful in helping to sober a drunken person. Afterward put him to bed and let him sleep it off.

Thermal Injuries. Thermal injuries are injuries to the body caused by the effects of excessive heat or cold. Chemicals, in addition to their toxic effect, may produce a thermal injury. The effect of heat or cold may be either general or local. Some of the common thermal accidents and the first aid treatment to relieve them are related in the following paragraphs.

Sunstroke is a rather rare condition but quite alarming when encountered. It results from exposure to the direct rays of the sun or other source of high temperature. Usually the victim is unconscious, his face is flushed, his skin is *very hot* and dry, his breathing labored, and his pulse rapid and strong. Call a doctor at once. Move the victim to a cool, shady spot; loosen his clothing, and apply ice or cold towels to his head and body. Do not give him any stimulant, even if he is conscious. The victims of this thermal accident often have a preceding headache, dizziness, and nausea, and a feeling of being oppressed by the heat. Should they go in time to a cool, shady spot and lie down, actual sunstroke may be prevented.

Heat exhaustion is a rather common condition, usually the result of continued exposure to heat and humidity, indoors or outdoors. The victim of heat exhaustion is in a state of shock, as described above. The treatment is the same as for shock. Heat exhaustion is a preventable condition. Men who are losing large quantities of body fluids by profuse sweating should take a small amount (a quarter teaspoonful) of table salt with each glass of water. If the salt is taken first it does not increase the natural thirst.

Burns and scalds. Burns are injuries caused by hot solids or flames coming in contact with parts of the body. Scalds are injuries caused from hot liquids. They are classified as first, second, or third degree burns, depending upon the amount of damage to the body tissues:

First degree burn—redness of the skin.

Second degree burn—blistering and redness of the skin.

Third degree burn—charring and destruction of the deeper tissues. First and second degree burns are also usually present in third degree burns.

The immediate effect of a burn is the local effect; if sufficiently painful and extensive it will cause shock. After absorption of the toxic products of a burn, the toxemia may produce vital changes in the liver and kidneys, making treatment of the patient very difficult. Proper first aid treatment will do much to prevent such complications later. The treatment of burns and scalds is similar.

Treatment of burns and scalds. Carefully remove the person burned to an area of relative cleanliness where the clothing can be gently removed from the affected part without increasing the chance of future infection. If the burn is extensive (third degree burn) a doctor's services should be secured immediately as the correct, early treatment may prevent possible permanent disability. Do not apply grease, salve, oil, or any household remedy. Use nothing on the burn that will be difficult to remove afterwards. If the patient insists that something be used apply bicarbonate of soda as it is easy to remove. Place clean linen under the patient and protect the burned portion from the drafts of air by a frame or cradle holding the covers off the body. Keep the patient warm and as comfortable as possible until the doctor arrives. Treat for shock if indicated.

If the burn is not extensive or severe (first or second degree) a tannic acid ointment (5 per cent) or a picrate ointment may be applied to the affected area. Bandages should be sterile and placed on very loosely. Do not open blisters.

Precautions in case of fire. Keep cool, do not get excited. If a person's clothing is on fire make him lie down or throw him to the floor or ground. Smother the flames by wrapping him in a blanket, rug, coat, or similar article. If your own clothing catches afire when you are alone, lie down on the floor and roll up as tightly as possible in a rug, blanket, or similar article, leaving only the head out. If there is nothing in which to wrap up, lie down and roll over slowly, at the same time beating out the fire with the hands. If caught within or obliged to enter a house which is full of smoke, cover the mouth and nose with a wet cloth or handkerchief. Also, remember there is less smoke within 6 inches of the floor, so when you can no longer breathe in an upright position get down and crawl with the mouth close to the floor.

Electric shocks and burns. Electric shocks and burns result from contact with wires or equipment carrying a high tension current. The most important thing to do is to remove the person from such contact. This is always likely to be dangerous and should not be attempted until the rescuer has some way of insulating himself, otherwise he may receive as severe a shock or burn as the person he is trying to rescue. First, take steps to have the power cut off. Stand on a heavy rubber mat, or dry boards, and protect the hands with some insulating material such as heavy rubber gloves, several thicknesses of dry cloth, or other non-conductor, before attempting to separate the victim and the source of the current. It may be easier to push the wires aside, or the victim away from the source of electricity, using a long piece of dry wood while standing on a dry or insulated platform. Electric shock exhibits symptoms similar to wound shock and is treated the same way. It arrests respiration if the shock is severe, and artificial respiration must then be used. Electric burns are treated the same as burns from other causes.

Injuries from freezing. The first effects of extreme cold are pain and a sensation of cold followed by numbness, stiffness, a great drowsiness, and a desire to lie down and sleep. If yielded to, this desire for sleep may lead to death unless the person receives adequate and careful treatment. The most common injury resulting from freezing is that of frost-bite or chilblain, affecting parts of the body which are exposed and have the least adequate circulation.

The rational treatment of freezing and frost bite must be based upon the safe restora-

tion of the normal physiology of the tissues involved. The traditional treatment for freezing and frost bite is irrational. Vigorous rubbing with snow or ice (the traditional treatment) is poor because the small veins and capillaries in the frozen part or parts are already filled with small ice-crystals and the tissue is stiff and brittle. The part looks white or bluish-white. Since the circulation has ceased in the frozen part, any heat applied to it will not be conducted away. The tissue will be more sensitive to heat, and more easily damaged by heat if it is used to thaw the part. No temperature higher than the normal temperature of the body should be used in the treatment of frost bite.

The person suffering from freezing should be removed to a moderately warm shelter and permitted to reestablish gradually the normal circulation without undue physical disturbance. When the patient can swallow, mild stimulants such as warm liquids may be given. The affected frozen part or parts should be immersed in water at a temperature of 99.5 degrees Fahrenheit—no higher—and allowed to remain without massage or manipulation until well thawed. Infection must be guarded against carefully after thawing as the tissue vitality is very low and the danger of infection is markedly increased.

When breathing has stopped artificial respiration should be used. When circulation has been reestablished to all parts of the skin, the temperature of the room can be gradually increased to normal room temperature (72 degrees F.). Wrapping the patient loosely in clean sheets and using gradually increased temperatures of water sprinkled on the sheets serves as a satisfactory method where room temperatures cannot be controlled readily. In either case all clothing should be removed from the patient.

Poisoning. Poisoning is the effect produced by the action of poisons on the body, either internally or externally. Poisons are substances either in the form of liquid, solid, or vapor, which by their physiological action are injurious or destructive to life. They may be divided into two general classes:

Corrosive poisons.

Produce burns (corrosive action) whether taken internally or applied externally.

Most common are the caustic acids and alkalis.

Non-corrosive poisons. Produce their effect by:

Physiological action on the nervous system either stimulating or depressing the medullary centers, or affinity for the nerve tissue.

Primary effect on the gastro-intestinal tract, causing irritation, inflammation, and swelling of the alimentary tissues.

Note. Some poisons such as phenol and phosphorous may produce corrosive action and also produce a general effect on the body, whether taken internally or applied externally, if in sufficient amounts.

Treatment of poisoning. There are few conditions that require more prompt action and where the effects of first aid may be more life saving than poisoning. The treatment, providing there is no evidence of caustic action, consists of giving an emetic (produces vomiting) or using a stomach tube, the administration of a cathartic, and the use of an antidote. A specific antidote should be used if the poison taken is known; otherwise administer a general antidote which will neutralize the majority of poisons. The destructive result of the poison before it was neutralized is then treated, whether it be local, general, or both.

If there is evidence of caustic action, such as burned lips or tongue, do not give an emetic. Administer instead soothing oils, such as olive oil, cotton-seed oil, castor oil, and milk, internally. Give the proper antidote, if known. If an emetic is given to a patient suffering from corrosive poisoning the burned areas might rupture during vomiting. Since the poison is corrosive it would burn on the way up as well as down, thereby increasing the degree and extent of corrosive injury. If the proper antidote is not known, raw eggs and milk, flour and water, or hot strong tea, serve as antidotes. They also produce least irritation to the stomach mucosa and do not invoke vomiting.

General antidote. A general antidote is one that is given in cases where the nature of the poison is not known. However, it should be determined whether corrosive action has occurred. Tannic acid (which is abundant in tea) is a precipitant of alkaloids and

therefore antidotal to most of the vegetable poisons. Albumin which is found in eggs and milk is antidotal to mineral poisons.

Special antidotes. Special antidotes are used to counteract certain specific poisons. For example: hydrated oxide of iron for arsenic poisoning, salt for nitrate of silver, magnesium sulphate (Epsom salts) for phenol and sugar of lead, copper sulphate for phosphorus, and potassium permanganate for opium.

Emetics. An emetic is something which induces vomiting. Useful emetics are: mustard, ipecac, tartar emetic, zinc sulphate, or salt in hot water. The finger stuck down the throat may induce vomiting. Do not use an emetic or stomach pump in case of corrosive poisons.

Common poisons and their antidotes. Some poisons are encountered more frequently than others. A few of these are listed with a brief description of antidotes and treatment, many of which, it is realized, will be unavailable for first aid treatment.

Acids, mineral. Give solutions of sodium carbonate, magnesium oxide, lime water, chalk, plaster from the wall mixed with water, starch, milk, white of egg, or oil. Use no stomach pump.

Acid, carbolic (phenol). Stomach tube or emetic, alkaline liquids, white of egg, sodium sulphate or other soluble sulphates to hasten elimination from the circulation, warmth, and stimulation.

Acid, hydrocyanic. Empty stomach, flush stomach with hydrogen peroxide, inject 1.0 c.c. hydrogen peroxide solution subcutaneously every 5 to 10 minutes until circulation improves, cold water on chest and inhalations of ammonia for respiration, atropine hypodermically and aromatic spirits of ammonia for circulation, artificial respiration, and fresh air.

Aconite. Wash stomach or give emetic, tannic acid by mouth, stimulate heart, atropine subcutaneously, fresh air, artificial respiration.

Alcohol, ethyl. Stomach lavage, or emetic, strong coffee, keep body warm and head cold, aromatic spirits of ammonia and ammonia to nose for respiration, and artificial respiration.

Alcohol, methyl (wood alcohol). Follow above. Also give pilocarpine hydrochloride $\frac{1}{8}$ - $\frac{1}{2}$ grain, rectal injections salt solution, hot coffee, warm baths then cold effusions.

Alkalies. Do not use stomach tube. Emetics—copious drinks, tepid water, vinegar and water, orange or lemon juice, olive oil, whites of eggs, barley water, gruel, milk or linseed tea.

Arsenic. Stomach lavage, official arsenic antidote (ferri hydroxidum cum magnesi oxide), oil, gruel, starch, mucilages, eggs, relieve pain with morphine.

Belladonna (atropine). Stomach lavage or emetic, tannic acid, $\frac{1}{2}$ grain, pilocarpine, relieve pain, give stimulants.

Carbon monoxide. Artificial respiration in fresh air. Aerate the lungs as soon and completely as possible.

Chloral hydrate ("knock out drops"). Empty stomach at once, 5 to 10 grain doses of citrated caffeine, stimulate heart, keep awake, artificial respiration in event of respiratory failure.

Chloroform. If swallowed evacuate stomach, stimulate circulation, adrenalin into the heart if it has ceased to beat, hot and cold douches, and artificial respiration.

Cocaine. Evacuate stomach, tannic acid, inhalations of amyl nitrite, morphine for excitement, oxygen for asphxia, artificial respiration.

Iodine. Wash out stomach, abundance of boiled starch, sodium thiosulphate, 20 grains, relieve pain.

Lead compounds. Empty stomach, magnesium sulphate, milk and other demulcent drinks, morphine for pain.

Mercury and copper compounds. Empty stomach, white of eggs, milk or chopped raw meats, potassium iodide 10 to 20 grains, every 2 to 3 hours, relieve pain, fresh water. For copper salts give pure potassium ferrocyanide 15 grains in glass of water.

Mushrooms. Stomach tube, or emetics, castor oil and copious enemas, atropine hypodermically, stimulate, keep warm.

Opium and its derivatives. Siphon out stomach and wash stomach with potassium permanganate solution, tannic acid, strong *coffee*, *caffeine* and *atropine* as physiological antidotes, keep awake, artificial respiration if breathing fails.

Phosphorus. (Rat poison and matches). Lavage stomach, wash stomach with water containing 4 c.c. of oil turpentine; charcoal or lime water, magnesium sulphate. *Do not give fat or oil.*

Pilocarpine. Wash stomach or give emetic, tannic acid, *atropine* as physiological antidote.

Silver compounds. Wash stomach with *salt water*, give salt solution, white of egg, or milk, relieve pain.

Strychnine. Use stomach tube or emetic if time permits, *control convulsions at once with chloroform or ether* followed by chloral hydrate, morphine, or bromides. Give tannic acid by mouth.

Veronal. Wash stomach with tannic acid solutions, castor oil, enemas, hot and cold douches, stimulate heart, morphine for excitement during recovery.

FOREIGN BODIES

In the Eye. Search the corner with a good light; foreign bodies over the pupil are hard to see. Evert the lower lid and examine it; evert upper lid (Plate 29) and examine. Foreign bodies may be removed by a cotton swab on a match stick. Never rub an eye with a foreign body in it.

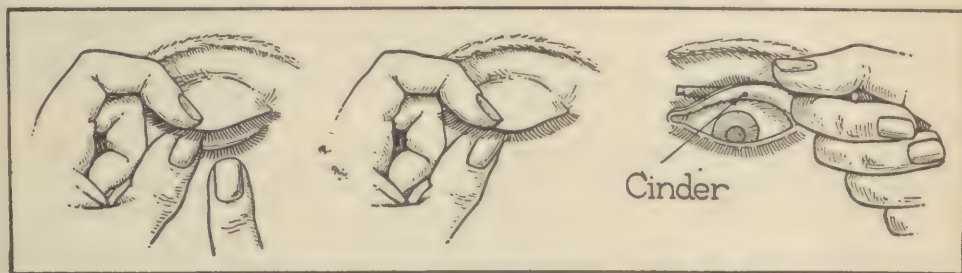


Plate 46. Removal of Foreign Bodies From the Eye.

If the eye has been splashed with an acid, flush it with an alkaline solution such as soda water or lime water. If with an alkali, use an acid solution such as diluted vinegar or lemon juice.

In the Ear. Foreign bodies in the ear are usually insects, cinders, or vegetable matter. If a live insect, hold a light near the ear, which will often cause it to come out. If not, lay the head on the opposite side and pour a few drops of light oil into the ear. This may kill the insect and float it out. An insect or cinder may be flushed out with water. Never use any liquid to flush out vegetable matter, as this may cause it to swell to a larger size.

In the Nose. Foreign bodies in the nose are easily expelled by closing the mouth and the other nostril and forcefully expelling air through the affected nostril. If the object is not vegetable matter the free nostril may be syringed with warm water, which will often wash it out. If none of these methods are effectual the foreign body may be gently pushed back through the nose into the nasopharynx and recovered through the mouth.

In the Throat and Larynx. Foreign bodies in the throat and larynx may be very serious. If they completely cut off the air, asphyxia will result in a very short time. Attempt to dislodge the particle by making the patient cough and slapping him on the back between the shoulder blades. A child should be dangled by its heels and shaken in an effort to dislodge the foreign body. Frequently by passing a finger down the throat the object may be reached. If none of these treatments are of avail an emergency tracheotomy may be necessary.

CHAPTER VII

AVIATION MEDICINE

AVIATION MEDICINE IN EVOLUTION

Man has always dreamed of flying. After centuries of those dreams, with experiment and the development of other necessary knowledge, the airplane became the answer to his quest. With the discovery of the art a new strain was placed upon the human system for the doctor to analyze, determine the hazards, and proffer a means by which they might be reduced in effect or entirely avoided. Thus the science of medicine has been made available to mankind in order to assure a greater safety and a more certain development of this tremendous achievement.

Pilots are exposed to environmental factors with which they are entirely unfamiliar. Each is placed in control of a powerful mechanical device which may tax to the utmost his mental and physical stamina. Ever increasing speeds and altitudes attained in flight force a close study of the human equation of the pilot which may lead to the complete recognition of the necessary physical and mental qualifications of flyers. The aviator must return instantaneous and correct mental and physical responses to all situations which may confront him, often with startling suddenness. The life of his passengers, the successful accomplishment of a mission, and the preservation of his plane, as well as his own life, may hang upon this slender thread. The science of aviation presents complex problems which must be fully understood, its phenomena completely charted. In this necessary work the doctor will find again his chance to serve humanity.

The following data traces the primary steps in medical knowledge from its inception, as it has been developed to meet the peculiar requirements of aviation.

1783

June 5. The first balloon flight without passengers was made at Annonay, France. In the same year the first effort was made to study the effects of flying upon life. Sheep and fowls were sent up a few hundred feet in balloons, the investigators discovering to their surprise that no ill effects resulted from the ascent.

December 17. The first record of physical discomfort from altitude was made during a balloon ascent to 10,500 feet. The balloonist complained of the severe cold as well as pain in his right ear and jaw.

1786

Ballooning was recommended for convalescents and to promote longevity. The first handbook on aeronautics was published. The author, although not a doctor, believed the change from the hot and impure air near the ground to the cool, pure air aloft, which was said to be impregnated with aerial acid, was beneficial to the sick. He stated: "The spirits are raised by the purity of the air and rest in a cheerful composure. In an ascent all worries and disturbances disappear as if by magic." Diseases such as tuberculosis and neuralgia he claimed could be cured by the therapeutic value of the atmosphere at high altitudes.

1800

Scientific records were made of the effect of altitude upon the human body. The ill effects were called "balloon sickness". Doctors of medicine were among the pioneers in these early scientific studies.

1866-1870

Dr. Charles H. Blackley made a quantitative study of the pollen content of air. Oil-coated slides were exposed at ground levels to collect the pollens deposited by the force of gravity. Then, by means of sending these oil-coated slides aloft on kites, he exposed them at altitudes of from 1,000 to 1,500 feet. His experiments proved the abundance of fungus spores present in the air and the possibility that their allergic reactions were similar to those of pollens.

1903-1911

In December, 1903, Wilbur and Orville Wright made four successful power-driven flights

in an airplane at Kitty Hawk, North Carolina. On February 10, 1908, the United States Army signed a contract with the Wright Brothers for the purchase of the first Army plane.

On September 17, 1908, Lieutenant Thomas Selfridge, Signal Corps, was killed and Orville Wright severely injured at Fort Myer, Virginia, when their plane crashed. This was the first fatal accident resulting from flying.

There was little medical interest in aviation except the spasmodic interest in the physiology of altitude. Although the speed factor was beginning to be added to that of altitude, no special physical examination was required for military aviators, and no physical examination of any kind for civilian aviators was required during this period.

1912

February 2. The War Department published the first instructions concerning the physical examination required of candidates for aviation duty. In its preparation the Surgeon General, collaborating with the Chief Signal Officer, devised a special preliminary physical examination to be required of all candidates for instruction at the Signal Corps Aviation School.

February 7. The draft of the plan for this special preliminary physical examination was submitted to the Secretary of War for approval. It was, in brief, as follows:

All candidates for aviation duty to be subjected to a rigorous physical examination to determine their fitness for such duty.

The examination to conform to the standard required for recruits, with the following additions:

The *visual acuity* without glasses to be normal. Any error of refraction requiring correction by glasses or any other cause diminishing acuity of vision below normal to be cause for rejection. The candidates ability to *estimate distances* to be tested. *Color-blindness* for red, green, or violet to be a cause for rejection.

The following tests for *equilibrium* to be made to detect otherwise obscure diseased conditions of the internal ear:

The candidate to stand with knees, heels, and toes touching.

The candidate to walk forward, backward, and in a circle.

The candidate to hop around the room.

These tests to be made first with the eyes open, and then with the eyes closed, on both feet and then on one foot. Deviations of a persistent nature, either right or left, were held to indicate the presence of a diseased condition of the internal ear. *Nystagmus*, frequently associated with this condition, was also a cause for rejection.

Any disease of the *circulatory system*, either of the heart or arterial system, *respiratory system*, or *nervous system* to be a cause for rejection.

The precision of the *movements of the limbs* to be tested with special care.

Any candidate whose history showed that he had ever been or was afflicted with chronic digestive disturbances, chronic constipation, or intestinal disorders tending to produce dizziness, headache, or impairment of vision to be rejected.

October 8. The United States Navy published instructions governing the physical examination required of their candidates for aviation duty which were similar to those used by the Army. There was added a group of exercises to determine the precision of the movements of the limbs. Should these exercises manifestly tire the individual he was required to be further examined to discover the presence of a defect or deformity. A marked departure from normal blood pressure was considered to be a cause for rejection in the Navy test.

1913

A plan for the conduct of examinations and selection of pilots was instituted by Germany.

1914

Italy adopted a special physical examination for Army flyers.

July. Civilian aviators in the United States, whose fame as flyers was well known to the public, had never been examined physically.

1915

Great Britain made an analysis of her air casualties for the first year of the World War which showed that 2 per cent of the pilots met death at the hands of the enemy, 8 per cent from defective planes, and the remaining 90 per cent due to pilot errors. The British thereupon established a special "Care for the Flier Service," whereby the aviators were selected with due regard to their physical and mental qualifications. At the end of the second year fatalities attributed to physical and mental defects were reduced to 20 per cent and at the end of the third year to 12 per cent. Thus Great Britain demonstrated the benefits of a special medical examination for flying personnel.

1917

April 6. The United States entered the World War. At this time the aviation personnel of the Army consisted of 65 officers and 1,120 enlisted men. In a little more than a year it was expanded to 14,230 officers and 124,767 enlisted men. The knowledge and experience of the Allies was placed at the disposal of the United States Army.

April 28. *The Air Service Medical* was organized. Major T. C. Lyster recommended that a medical officer be placed in charge of the physical examination of all applicants for duty with the Aviation Section, Signal Corps.

May. Form 609, A. G. O., which was later designated Form 64, A. G. O., (still used for recording physical examination of Air Corps officers) was prescribed for recording the physical examination for flying.

May 11. Major T. C. Lyster, in addition to his other duties, was detailed to take charge of the aviation work in the Surgeon General's Office. This assignment included the supervision of administrative requirements for the physical examination of all applicants for duty with the Aviation Section, Signal Corps.

July. Sixty-seven Physical Examining Units were established in cities of the United States.

September. Colonel T. C. Lyster was assigned to duty as the Chief Surgeon, Aviation Section, Signal Corps.

October. *The Medical Research Board and Medical Research Laboratory* for the study of aviation medicine were organized. The Board consisted of Major John B. Watson, S.O.R.C., Major Eugene R. Lewis, M.R.C., Major William H. Wilmer, M.R.C., Major Edward G. Seibert, M.R.C., and Dr. Yandell Henderson, a civilian. The purposes of the board were: (1) To investigate all conditions which affect the efficiency of pilots; (2) To institute and carry out, at flying schools or elsewhere, such experiments and tests as would determine the ability of pilots to fly in high altitudes; (3) To conduct experiments and tests to develop suitable apparatus for the supply of oxygen to pilots in high altitudes; (4) To act as a standing medical board for the consideration of all matters relating to the physical fitness of pilots.

The board instituted six departments of the Medical Research Laboratory and appointed a director for each: *Otology, Cardiovascular, Physiology, Psychology, Psychiatry and Neurology, and Ophthalmology.*

December. General Theodore C. Lyster and Major Isaac Jones were sent to Europe to investigate the work in aviation medicine as developed by the Allies of the United States.

1918

The Central Medical Research Laboratory, Hazelhurst Field, Mineola, New York, was completed and began operation.

June. The laboratory space of the Central Medical Research Laboratory was enlarged to three times its original size. The officer personnel was much increased, barracks were erected for the enlisted men, and the work at the laboratory increased rapidly both in amount and importance. The laboratory also functioned as a training school for flight surgeons and for instructing physical trainers for their work at the several flying schools. Officers and enlisted men were instructed in the methods and duties of classification-units for selection of pilots. Aviators were given low-oxygen-tension tests, either in low pressure tanks or by means of the rebreathing machine. By this time the selection of the flier had been standardized, his care put in charge of flight surgeons, and the classification of the aviator recognized as a vital necessity for the efficiency of the Air Service.

The term "Chief Surgeon, Aviation Section, Signal Corps" was eliminated because the Air Service Division (Air Service Medical) was created as part of the Surgeon General's Office.

July 6. Branch medical research laboratories were established at twenty flying fields.

The Manual of the Medical Research Laboratory was published by the War Department.

August. In response to a cable from General Pershing, 34 officers and 15 enlisted men who had been well trained in laboratory methods sailed for Europe. Colonel William H. Wilmer headed the Medical Research Board of the American Expeditionary Force. He concluded that the board saved the lives of hundreds of aviators and, with the cooperation of the pilots, would save hundreds more. The board was created to advise, cooperate with, and assist aviators in saving themselves.

October. The Air Service Manual was published.

1919

March 14. The Medical functions of the Air Service were returned to the administration of a Chief Surgeon, Medical Section, Air Section, as had been the case during the early part of 1918.

May. The first course of instruction for flight surgeons, eight weeks in duration, was given at the Medical Research Laboratory, Hazelhurst Field, Mineola, New York. It was the first systematic course of its kind.

August-November. The Medical Research Laboratory and School for Flight Surgeons was moved to Mitchel Field, New York. The course for flight surgeons was extended to four months.

1920

The War Department published Document Number 1004, "Aviation Medicine in the American Expeditionary Force".

1921

February. The War Department listed the Medical Research Laboratory and School for Flight Surgeons as a "special service school".

March. A fire destroyed many of the records and much of the equipment of the School for Flight Surgeons.

During this year Dr. E. C. Stakman made the first quantitative tests of upper air pollens and spores during his investigation of the spread of black stem rust of wheat. In Louisiana, Dr. William Scheppegrel made a study of the concentration of pollen in the upper air. He recognized several types of pollen and concluded that spores were not responsible for hay fever.

Since 1921 airplanes and balloons have been used to collect samples of fungus and spores, oil-slides or agar plates being used as a surface area for collection. These studies have furnished a major part of the present knowledge of air-borne allergens.

1922

April. The first group of medical officers of the Navy was graduated as flight surgeons.

November 8. The Medical Research Laboratory and School for Flight Surgeons was changed to "The School of Aviation Medicine" by A.R. 305-105.

1923

The Adjutant General approved extension courses to be given by the School of Aviation Medicine.

1926

Lieutenant Colonel David A. Myers established by research the basic principles, from the human standpoint, on which the art of blind flying is founded. His work was done in collaboration with Lieutenant Colonel William C. Ocker, Air Corps, who is the father of blind flying. It was published in the Army Medical Bulletin of July, 1937.

The first text book on Aviation Medicine was published by Colonel Louis H. Bauer. He was appointed Medical Director of the Aeronautics Branch of the Department of Commerce which was created this same year. Medical examiners were appointed by the Department of Commerce throughout the United States so that the examination of private

and student pilots, as well as commercial and industrial pilots, would be made promptly and with little inconvenience.

June 30. The School of Aviation Medicine was moved from Mitchel Field, New York, to Brooks Field, San Antonio, Texas, where it occupied the "Big Balloon Hangar" until its next move.

1927

May. The School of Aviation Medicine was moved out of the balloon hangar into permanent quarters.

1929

October 7. Following a number of preliminary conferences stimulated by the Medical Section of the Aeronautics Branch of the Department of Commerce, the *Aero Medical Association* was organized at a meeting held in Detroit, Michigan. The announced purpose of this organization was to make a study of the new specialty, "aviation medicine." It was decided at this meeting to produce a journal devoted to the study of the subject.

1930

The first issue of the "Journal of Aviation Medicine" was published.

1931

A pamphlet entitled "Aviation Medicine" was published by direction of the Secretary of War at the Medical Field Service School. It is Army Medical Bulletin No. 26, copies of which can still be secured through the Book Shop, Medical Field Service School, Carlisle Barracks, Pennsylvania.

October 30. The School of Aviation Medicine was moved from Brooks Field to Randolph Field, San Antonio, Texas, the site of the Air Corps Primary Training Center. This location enabled it to function advantageously as a teaching as well as a research institution.

1933

Major Malcolm C. Grow, Post Surgeon, Fairfield Air Depot, Patterson Field, Ohio, advocated the establishment of a medical laboratory at Wright Field near Dayton, Ohio, to be a part of and to work with the Experimental Engineering Section of the Materiel Division of the Air Corps. He experimented on clothes suitable for flying and the effects of carbon monoxide gas from internal combustion engines.

During the year Colonel and Mrs. Charles A. Lindbergh exposed 27 slides over Greenland and the North Atlantic. This study of pollens was projected by Dr. F. C. Meier of the United States Department of Agriculture.

1934

Colonel Malcolm Grow was transferred to the Office of the Chief of the Air Corps as Chief of the Medical Section. Captain Harry G. Armstrong, Medical Corps, was sent to Wright Field for the sole mission of establishing and supervising the research unit.

1935

May 29. The Chief of the Air Corps directed that a Physiological Research Laboratory be created at the Materiel Division of the Air Corps at Wright Field, Dayton, Ohio. This was promulgated for the purpose of continuing the experiments which Lieutenant Colonel Malcolm Grow had started in the spring of 1933 on his own initiative. His study of the various types of clothing and the relationship to high altitude flying helped to convince the Air Corps authorities of the need for a physiological research laboratory.

1937

January 1. The Physiological Research Laboratory was completed. Captain Harry G. Armstrong, Medical Corps, was announced as the Director, and Dr. J. W. Heim was placed in charge of research. (Further details about the laboratory are to be found in a later paragraph of this chapter.)

The first issue of "Flight Surgeon Topics" was published by the School of Aviation Medicine. The chief purpose of this publication is to distribute to flight surgeons timely information on aviation medicine and related topics.

Dr. F. C. Meier, Department of Agriculture, who had promulgated many upper-air studies since 1931, originated the term "aerobiology," for the science of allergy and bacteriology of the air. Dr. Meier and Dr. E. B. McKinley, his co-worker, were lost with the Hawaiian Clipper while making studies over the Pacific Ocean.

1938

September 2, 3, and 4. The Tenth Annual Convention of the Aero Medical Association was held at Dayton, Ohio. At this convention the School of Aviation Medicine displayed an exhibit of items important to aviation medical circles.

October 13, 14, and 15. The School of Aviation Medicine provided an exhibit at the 46th Annual Convention of Military Surgeons of the United States which was held at Rochester, Minnesota.

During this year upper-air studies (aerobiology) were conducted on a large scale by O. C. Bonham, botanist, during the ragweed season. Slides were made over nine states at elevation levels up to 9700 feet. These studies were made from planes of commercial air lines operating between Denver and New York. No heavy contamination was found to exist above 5000 feet, but allergens were located at 7500 feet and a few at 9000 feet. Planes with enclosed cabins were found to be relatively free from pollen contamination. Aerobiology, greatly facilitated by aviation, offers a new field for medical research.

"Special Flying Cadet Examining Boards" were appointed to visit many colleges and universities to acquaint students with the army flying training program and to conduct physical examination of applicants for training as flying cadets.

1939

April 1. The Medical Section was re-designated the Medical Division and assigned to the Training Group, Office, Chief of the Air Corps, by order of the Chief of the Air Corps.

1940

Changes in Army Regulations provided that graduates of the School of Aviation Medicine would be rated as "Aviation Medical Examiners." An aviation medical examiner who has served a minimum of one year of active duty with the Air Corps after having received such qualifications and who has demonstrated that he possesses the required qualifications may be rated as "Flight Surgeon."

THE FLIGHT SURGEON

The Flight Surgeon is a doctor of medicine who has received additional training and experience in aviation medicine. He bears the same relationship to aviators as does the specialist in preventive medicine to mankind in general in that both deal with the prevention of disability and the maintenance of physical efficiency. At the present stage of development of the subject this training may be secured only at the School of Aviation Medicine which is maintained by the Army at Randolph Field, Texas. All flight surgeons of the Army or Navy as well as the Medical Directors of the Department of Commerce and Medical Directors of the larger commercial air lines are graduates of this school who have been recommended by its faculty as qualified for the duty. The relatively few doctors of medicine in civilian practice who include this specialty are almost entirely drawn from the Medical Reserve Corps of the Army or Navy who have been trained and certified as qualified at this important Army school. It is a worthy and useful career for the air-minded medical man.

Duties of the Flight Surgeon. It is a well established fact that many persons lack the physical or psychological make-up to function efficiently and with safety in three-dimensional space; therefore many people are unqualified to operate airplanes. The British proved this in the World War when, by identifying the cause of crashes, they reduced the accidents resulting from pilot failure by 50 per cent the first year of corrective methods and to less than 12 per cent during the second year.

The aviator, and especially the military aviator, must have vision that is nearly perfect. It is essential that he have a strong heart and an efficient circulatory system in order that he may tolerate altitude and cold. He requires perfect neuromuscular control and co-

ordination for the complicated manipulation of airplanes at all altitudes while in flight. He needs a psychological equilibrium capable of instant and correct judgement to meet the situations which develop in his routine duties. The detection and recording of these conditions is an important responsibility of the flight surgeon.

One of the important duties of the flight surgeon is to examine candidates for flying instruction in order to eliminate all who do not clearly meet the standards which are known to be necessary. In this way young men who are potential crash victims because of some physical or mental shortcoming which may be entirely unknown to them are saved from hazards they are not constituted to meet.

It is not enough to make certain that flying candidates are physically and mentally qualified for the tasks before them. Aviators must be re-examined at periodic intervals and their health kept under close observation by a flight surgeon. In this way only may the diminution of any of these essential qualities be detected in time to prevent the hazards of the air which lead to crashes. It is desirable and necessary that the flight surgeon acquaint himself with the life and habits of each pilot under his medical supervision to detect practices or conditions which may injure his physical or mental health in any way or which may affect his ability as a flier. The maximum safety to passengers, plane, and pilot may be obtained only when aviators are able to meet to a satisfactory degree the physical and mental requirements which experience and research have proven to be necessary.

Further responsibilities of the flight surgeon are the classification of pilots for high altitude missions and the type of airplane to which the pilot is best suited.

In the Army in peacetime the flight surgeon carries on the normal duties of the medical officer as well as his specialty. The preservation of health, the prevention of disease, and the care of the sick are no less important in the Air Corps than with the rest of the Army, and the same administrative duties are required. He must, however, become more thoroughly familiar with the administrative details pertinent to the handling of sick and injured in the Air Corps. He must constantly be alert to the activities of the officers of the Air Corps, socially as well as on duty, in order that he may determine or locate influences that might affect those officers who might indirectly come under his care.

The duties of the flight surgeon are broad and in the special sense very detailed and specific, in order to bring many generalities to a fixed conclusion. Reaction and behavior must be recorded and scrutinized by experience and knowledge in order to protect human life and property and to keep our air force in the most efficient condition.

Qualifications of the Flight Surgeon. The flight surgeon must be equipped with an extensive *professional knowledge*, experience and interest in his medical work, including a knowledge of psychology, psychiatry, ophthalmology, otology, cardiology, traumatic orthopedics, altitude physiology, and the special problems of aviation medicine. He must be thoroughly informed about the work of the airplane pilot.

Certain *personal qualifications* are necessary. His character and professional attainments must be of such high standards as to inspire the confidence and respect of the flying personnel. The fliers will then realize that he can smooth out their various problems and difficulties; that because of his interest, manifested by tact, sympathy, tolerance, and sincerity, they feel his aim is to keep them in such condition that they will be fit to fly. The flight surgeon must have initiative, be emotionally well-balanced, a good mixer, and of unquestionable character and good habits. He must be willing to fly with pilots whom he finds physically qualified for flying. His knowledge of flying, of airplanes, and of Air Corps tactics must be such as to enable him to understand the problems, difficulties, and dangers of the pilot and to discuss them intelligently.

Flight surgeons are not made in a day, and, as in any specialty, their value increases with their experience. *Practical experience* will add much to his knowledge, and over a period of years the Army or Navy flight surgeons will have had many pilots under their care and supervision, learning their individual habits, qualifications, and characteristics. They will come to know these pilots so intimately that this knowledge may be the indirect means of saving valuable lives and property by preventing crashes by pilots who

are borderline cases, and who would be removed from flying, at least temporarily, by experienced flight surgeons. As aviation medicine, a product of the World War, is one of the youngest specialties, the flight surgeons of today are comparatively young. Although years of experience with troops, hospitals, and the general practice of medicine increase his wisdom, the flight surgeon must never lose his sense of appreciation for the joys and sorrows of the young pilot. The flight surgeon must realize that as long as he is in the company of one more of the pilots under his care, he is never entirely "off duty." He must study each pilot without prejudice or personal feelings, until he can detect the slightest departure from normal health, almost before the subject himself becomes aware of it. He must learn when to warn, when to comfort, and when to ignore.

How to Become a Flight Surgeon. In accordance with Par 18, A.R. 350-500 the following information is extracted for reference:

Selection and detail of officers and enlisted men for courses at the School of Aviation Medicine will be made upon recommendation of the Surgeon General and the Chief of the Air Corps.

Officer students, so far as practicable, for each of the courses specified below will be selected from the classes of officers indicated in connection with those courses.

Basic Course. Officers of the Medical Corps of the Regular Army. Officers of the Medical Corps of the National Guard and of the Medical Corps Reserve who are eligible in accordance with instructions of the War Department and who are willing to devote the necessary time to this course.

Extension Course. Medical officers of the Regular Army, National Guard, and Organized Reserves, in accordance with such policies as may be prescribed from time to time by the War Department.

Graduate Course. Such graduates of this school as may be recommended by the commandant and the Surgeon General as having shown special aptitude for the study of medical subjects in their relation to aviation.

Successful completion of the Basic Course of instruction for the complete period of four months, or the completion of the extension course of instruction and six weeks of the practical training given in the Basic course, and recommendation of the faculty of the School of Aviation Medicine qualify a medical officer as an aviation medical examiner. A year of active duty thereafter with the Air Corps is required for qualification as flight surgeon.

THE SCHOOL OF AVIATION MEDICINE

The School of Aviation Medicine was established at its present site at Randolph Field, San Antonio, Texas in 1931. Randolph Field is the Primary Training Center of the Air Corps and offers an excellent location both geographically and functionally for the training of flight surgeons and technical assistants to flight surgeons.

Purpose. The School of Aviation Medicine was created to instruct medical officers of the Regular Army, National Guard, and Reserve Corps to perform efficiently the special duties of flight surgeons, in peace or war, and to coordinate such duties with other professional and non-professional activities which they may be called upon to perform as medical officers of the army.

Origin and History. To continue the training of flight surgeons after the World War, the School of Aviation Medicine was established in 1919 at Mitchel Field, Long Island, New York. The United States had in October, 1918, instituted a Medical Research Board to investigate all conditions which affected the efficiency of fliers. This early work was done at Hazelhurst Field, Mineola, New York, where the Medical Research Laboratory was established. Medical officers of the Army were detailed to this laboratory for special training in aviation medicine, and following such training these specialists served with various army aviation units. They became known as flight surgeons. In February, 1921, the Medical Research Laboratory and School for Flight Surgeons was classified and listed as a special service school. In November of the following year the name was changed to its present one, 'The School of Aviation Medicine,' by A.R. 305-115. The school was moved from Mitchel Field, New York to Brooks Field, Texas in 1926. It was housed

there in the "Big Balloon Hangar" until May, 1927, when more permanent quarters were provided. Upon the establishment of the Air Corps Primary Training Center at Randolph Field, Texas, the school was moved in 1931 to its present location at Randolph Field. The building for the School of Aviation Medicine is adjacent to the station hospital building, permitting close professional contact with the local medical establishment. The School of Aviation Medicine in conjunction with the Primary Training Center functions as a teaching and research institution.

Organization and Administration. The School of Aviation Medicine is under the jurisdiction of the Chief of the Air Corps, and is supported financially by the Air Corps. The Surgeon General of the Army cooperates in arranging its program of instruction and in securing candidates for flight surgeons for the Air Corps from the Medical Corps of the Regular Army.

The function of the school is three fold: (1) instruction and training; (2) investigation and research; and (3) the conduct of extension courses.

The personnel of the school includes a commandant, assistant commandant, executive officer, adjutant, instructors, enlisted men, civilian clerks, and technicians. The school is divided into four departments, each one in charge of a director who is a member of the faculty: *Ophthalmology and Otology*, *Aviation Medicine*, *Psychology*, and *Neuropsychiatry*. These departments have specific objectives with reference to the training and instruction of flight surgeons:

Ophthalmology and Otology. To instruct student officers in:

- The fundamentals and the basic factors of ophthalmology, such as the anatomy, histology, physiology, and pathology of the eye and its adnexa.
- The diagnosis and the treatment of common ocular affections.
- The special diagnostic methods and instruments utilized in the examination of the eye.
- The anatomy and physiology of the nose, throat, and ear, with special attention to the labyrinth.
- The diagnosis and treatment of the common affections of the ear, nose, and throat.
- The care and maintenance of the flier; ophthalmological and otological aspects.
- The procedure of conducting the examination of the eye, ear, nose, and throat for flying, in accordance with A.R. 40-110.

Aviation Medicine. To instruct student officers in:

- The diagnostic methods especially applicable to the physical examination for flying.
- Abnormalities and anomalies of general bodily function, with special reference to the cardiovascular system.
- The ill effects of low oxygen pressure on flying personnel and methods employed in preventing anoxia at high altitudes.
- The cause and prevention of fatigue.
- The physiology and hygiene of muscular exercise.
- The organization and function of the Air Corps and of the Medical Department on duty with the Air Corps.
- Airplane accidents with special reference to:
 - The common accidents and injuries resulting therefrom.
 - Demonstration of, and instruction in, the use of crash tools.
 - Methods of splinting.
 - The use of orthopedic appliances as temporary fixation and treatment before and during transportation.
- The care and maintenance of the flier; general physical aspects.
- The preparation of records, reports, and returns which pertain exclusively to the Medical Department on duty with the Air Corps.
- Technical subjects pertaining to aviation, Air Corps tactics and organization, together with a sufficient number of demonstration flights in various types of aircraft in order that the student may better understand and appreciate the problems of the pilot; all by selected Air Corps instructors.
- The procedure of conducting the general physical examination for flying in accordance with A.R. 40-110.

Psychology. To instruct student officers in:

The methods and subject matter of psychology.

The methods of determining the psychological fitness of applicants for flying training by means of neuropsychic examinations, reaction time tests, and flying adaptability tests.

The methods of detecting beginning psychological inefficiency in flying personnel.

The care and maintenance of the flier; psychological aspects.

The procedure of conducting the psychological examination for flying in accordance with A.R. 40-110.

Neuropsychiatry. To instruct student officers in:

The fundamentals of psychological conception of mental disease.

The psychopathic personalities and their reactions.

The minor psychoses.

The frank psychoses.

The care and maintenance of the flier; neuropsychiatric aspects.

The procedure in conducting the neuropsychiatric examination for flying in accordance with A.R. 40-110.

Courses of Instruction. The instruction and training which the school gives to officers of the Medical Corps of the Regular Army, Navy, National Guard, and Reserve, includes:

The organization and administration of the Medical Department as related to special requirements of the Air Corps.

The principles and technique of physical examination for flying training and tests of fliers.

The application of tests for physical efficiency.

The physical care of fliers.

The medical specialties as related to aviation medicine, including neuropsychiatry, physiology, ophthalmology, otology, psychology, and cardiology.

The instruction and training given to selected enlisted men for specialists' courses is made up of those subjects required for proficiency as first, second and third class technicians of the Medical Department and for qualification as assistants to flight surgeons.

The *Basic Course* of instruction for the Regular Army and Navy medical officers who are selected to attend the school for the purpose of becoming flight surgeons covers a period of four months. Two basic courses are conducted annually, commencing July 15th and December 1st of each calendar year. On completion of the course, Army aviation medical examiners proceed to Air Corps military establishments.

Army *extension courses* in aviation medicine and allied subjects of the basic course of instruction are conducted by correspondence for medical officers of the Regular Army, Reserve Corps, and National Guard, requiring approximately two years to complete. Upon successful completion of the correspondence course, the medical officer may apply for attendance to the resident's course of practical training to complete qualification for a flight surgeon.

The supplementary *resident's course* of six weeks' duration is given at the school for the practical training of Medical Reserve Corps and National Guard officers who have completed the correspondence courses to enable these officers to qualify as flight surgeons. This practical training is given during the latter part of each basic course; upon successful completion a certificate of graduation as an aviation medical examiner is awarded.

The purpose of each of the above courses is to fit officers of the Medical Corps of the three components of the Army of the United States to perform efficiently the duties of a flight surgeon in the professional, administrative, and personal relations:

Selection of candidates for flying.

Care of the flier.

Classification of the flier.

Including the year 1940, over 550 medical officers have graduated and been qualified as aviation medical examiners and flight surgeons on completion of one of the above courses.

A *graduate course* of instruction is given to graduates of the school as may be recom-

mended by the commandant and the Surgeon General as having shown special aptitude for the study of medical subjects in their relation to aviation.

Two specialists' courses of three months each are given for selected enlisted men of the Medical Department of the Army, each of whom upon graduation receives a certificate as a specialist qualifying him as an assistant to a flight surgeon. This rating places them in position to accept ratings as first, second, or third class technicians in the Medical Department.

Besides the above course the school carries on many research projects in aviation medicine and the physical qualifications of flying personnel. Much research work is conducted in conjunction with the Physiological Research Laboratory at Wright Field, Dayton, Ohio.

The necessary detailed information relative to the provision, selection, and detail of students to the School of Aviation Medicine may be found in A.R. 350-500. Application to attend the School of Aviation Medicine should be forwarded to The Adjutant General, United States Army, Washington, D. C., through military channels.

THE PHYSIOLOGICAL RESEARCH LABORATORY

The Physiological Research Laboratory was created to conduct research pertaining to the development of equipment and matériel required to permit Air Corps personnel to function under the adverse and often abnormal conditions experienced in flight.

Origin and History. In October, 1918, during the World War, the United States Army instituted a Medical Research Board for the purpose of investigating all conditions which affected the efficiency of fliers. The board carried on its studies and investigation in the Medical Research Laboratory, Hazelhurst Field, Mineola, New York, which was completed and began operation the same year. In 1919 the establishment moved to Mitchell Field, New York, where the institution was known as the Medical Research Laboratory and School for Flight Surgeons, since, in addition to carrying on research, a course was given for flight surgeons. Army regulations changed the name to "The School of Aviation Medicine" in 1922, after which the research work conducted was carried on secondarily to the operation of the school. When the service school was transferred to Brooks Field, Texas, and later to the Air Corps Primary Training Center at Randolph Field, Texas, so much advancement had taken place in aviation that there became a need for research in the equipment and matériel in order to permit the pilots to function normally under the added strain and hazards of speed and high altitude flying.

With these considerations in view, the need for a research laboratory such as was operated during the World War and until 1920 became increasingly clear to Lieutenant Malcolm C. Grow, Medical Corps, then Surgeon of Patterson Field, near Wright Field, Dayton, Ohio. On his own initiative in the spring of 1933 he started some work at Wright Field. Each day, on completion of his regularly assigned duties at Patterson Field, he spent the rest of the day at Wright Field. Although no laboratory equipment was available, he experimented on aviation clothing, using several types of furs. Lambskin leather was found preferable to cordovan for outside covering of pilot garments because of its lighter weight. He also brought about the adoption of the ski-pants type of trouser with a snug cuff at the bottom.

Later, in 1934, Colonel Grow became Chief of the Medical Section in the Office of the Chief of the Air Corps, and Captain Harry G. Armstrong, Medical Corps, was sent to Wright Field for the sole purpose of setting up and supervising a research unit, Colonel Grow having convinced the Air Corps of the value of this laboratory. On May 19, 1935, the Chief of the Air Corps directed the Chief of the Matériel Division, Wright Field, to create the Physiological Research Laboratory. This laboratory was completed January 1, 1937.

The Physiological Research Laboratory is located at Wright Field, Dayton, Ohio, in the Main Engineering Experimental Laboratory building of the Matériel Division of the Air Corps. It contains: an office; physiological, biochemical, and high altitude laboratories; operating room; balance room; and stock room. A centrifugal force laboratory is located in a portion of the balloon hangar. The various rooms are separated by steel and glass

partitions and are completely air-conditioned, providing a suitable environment for gas analysis and other measurements requiring a uniform temperature. The biochemical laboratory is provided with all facilities for complete blood analysis and studies of a chemical nature. The large altitude chamber is of cylindrical construction and divided into three sections. A central compartment opens on either side into two end compartments, the central compartment serving as a lock through which entrance from the outside can be made to the other sections without disturbing the pressure conditions within. The chamber can be evacuated to the equivalent of 80,000 feet and can be refrigerated to -65 degrees Fahrenheit. The centrifugal force laboratory contains installations whereby forces twenty times the normal acceleration of gravity can be produced.

The office contains a library of standard medical books, reference works on aviation medicine, and appropriate current periodicals. All of the laboratories are fully equipped with the pertinent apparatus and devices to carry on their respective research.

The Physiological Research Laboratory is under the direction of an officer of the Medical Corps, who is termed the director. A doctor is in charge of the research. The work of the laboratory is coordinated with the research of the Matériel Division of the Air Corps located at the same field and also with the research work of the School of Aviation Medicine at Randolph Field, Texas.

Numerous projects have been completed since the laboratory was started, and many are undergoing continuous study. Research in the physiological requirements of high altitude flying is now one of the important projects of this laboratory. It presents a broad field for experimentation on the effects of cold, decreased atmospheric pressure, diminished oxygen supply, and allied climatic changes. In view of the many unsolved problems confronting aviation, due to more efficient performance of airplanes, the Physiological Research Laboratory will prove of great value in the advancement of aviation.

A new era in aviation is fast approaching. Large, multi-motored ships, manned by crews and flying at greater altitudes, are phenomena of the present day. Substratosphere flying may become a common occurrence. The construction of ships with sealed cabins, in which the barometric pressure at sea level is simulated, will allow the occupants to exist as comfortably and safely in the rarified atmosphere of great altitudes as they do on the ground. All this not only involves intricate engineering details but many physiological problems as well. The Physiological Research Laboratory at Wright Field, in charge of a flight surgeon, is conducting studies on physiological requirements for sealed high-altitude enclosures and on numerous other projects which affect the health and safety of Air Corps personnel.

CHAPTER VIII

THE MEDICAL ASPECTS OF CHEMICAL WARFARE

Chemical warfare agents are best classified, for the consideration of the medical officer, according to their physiological action, as follows: *lung irritants*, *vesicants*, *lacrimators*, *irritant gases*, *paralysants*, and *incendiaries*. This chapter contains basic information for the medical officer in order that he may have conveniently available a fundamental knowledge of these agents, their behavior on the human body, and the recommended treatment of casualties caused by exposure to gas. It includes the pertinent *physiology*, *pathology*, and *treatment* of these injuries. A chart at the end of this chapter lists the principle physiological actions and symptoms of each class, the agents pertaining to the several categories, and the first aid treatment which should be applied promptly under field conditions. For the tactical employment of chemical warfare agents and the measures of defense which are used to reduce their effectiveness see Chapter IX, "Defense Against Chemical Warfare."

LUNG IRRITANTS

Agents. The important lung irritants are *phosgene*, *diphosgene*, *chlorine*, and *chlorpicrin*. They are called lung irritants because of their primary physiological action.

Physiological Action. The main characteristic action of lung irritants is irritation and damage to the respiratory passages, with resulting inflammation and devitalization of the air cells in the pulmonary alveoli. The inflammatory process causes swelling of the lung tissues, due to the pouring out of fluid from the pulmonary circulation. This causes a condition known as "pulmonary edema", which interferes with the air cells making the proper interchange of oxygen and carbon dioxide. Respiratory embarrassment ensues, the patient has difficulty in carrying on the slightest degree of physical activity, and if the condition is not relieved this fluid level rises to such a point that asphyxiation is evident, simulating a man drowning. The drowning man, however, has no chemical destruction of the vital tissue lining of his alveoli.

When the edema proceeds to the extent that the normal oxygen content of the blood is below normal, cyanosis of the lips, mucous membranes, ears, hands, and feet are evidenced. Progressive dyspnea and cardiac failure may follow.

Phosgene. In *phosgene* poisoning the irritation is not pronounced and early symptoms of poisoning may be conspicuously absent; however, the pulmonary edema may be a delayed action. The victim may have a blue cyanosis or one of a gray pallor. The latter is usually fatal. Respiration is rapid but shallow, the pulse is very rapid and irregular, and the blood pressure very low. Some cases develop an acute dilatation of the right heart, and, when the heart is dilated to the state of inefficiency, the prognosis is very unfavorable. Phosgene affects the lung tissue proper rather than the upper air passages unless the victim has been exposed to very high concentrations. He will then show symptoms of coughing, pains in his chest, nausea and vomiting. If taken in low concentrations the action is delayed and the victim is not always aware that he has been seriously gassed. His realization will come when he develops the cough, cyanosis, and frothy sputum resulting from pulmonary edema. It is important that these cases be detected early in order to safeguard their prognosis by limiting their physical activity. During the course of pulmonary edema, the sputum shows three distinct layers when placed in a glass container: a bottom layer of mucilaginous apple-colored, jelly-like fluid; a middle layer which is serous; and an upper layer of froth. As the case progresses to the stage of bronchitis, muco-purulent pus which may contain numerous bacteria is expectorated.

Eighty per cent of the deaths which occur from phosgene poisoning take place before 48 hours have elapsed. Very few die if they get by this stage of pulmonary edema. The longer the edema lasts the more serious is the damage to the nervous system due to anoxemia. A rising hemoglobin and red cell count indicates that the edema is progressing; a falling hemoglobin indicates that the edema is decreasing. If the heart will tolerate the excess load until the decrease of the pulmonary edema, then the patient has a good chance for recovery.

Diphosgene. Diphosgene is more persistent than phosgene, having a persistence of 30 minutes in summer and 2 hours in winter. It has about the same effect as phosgene and in addition causes lacrimation.

Chlorine affects immediately the upper respiratory passage, the mucous membrane of the nose, throat, trachea, and the bronchi. It is manifested by a feeling of constriction, pain at the sternum, violent coughing, and gasping for breath. This immediate spasm of the respiratory muscles prevents the gas from reaching the distant air cells; however, later the muscles relax and the chlorine, upon contact with the air cells, sets up an inflammation and irritation that is quickly followed by pulmonary edema. The active coughing of the chlorine victim may create complications not present in the phosgene patient, such as emphysema, resulting from rupture of the alveolar walls.

Chlorpicrin in addition to being a lung irritant is an intense lacrimator, and this may be the first warning of its presence. It affects the entire respiratory tract, although its action is less violent than that of chlorine. The victim frequently becomes nauseated and vomits, and in high concentrations its toxicity may cause unconsciousness and death. It is claimed by some to be absorbed more readily into the blood stream than phosgene or chlorine, and thereby may cause impairment to the liver and kidneys. It has an irritant action on the skin, and renders ulcers, small skin bruises, and abrasions more susceptible to infection.

Treatment. Since the primary action of the lung irritants is on the lung tissues, every first aid measure should be taken to prevent pulmonary edema. If edema has developed the same treatment will still be indicated. Every means of conserving the oxygen requirements of the victim by preventing any physical exertion on his part is important. The patient should lie down and be carried on a litter to the first medical installation even if he insists on walking there. All of his clothing and equipment should be loosened. He should be kept warm in the recumbent position, and his condition regarded as serious from the start. He must, of course, be removed from the area of gas immediately.

Later, if available, oxygen therapy and venesection may be used to prevent the pulmonary edema. If the grey pallor stage has developed venesection is not indicated, but oxygen therapy will be found very beneficial. Non-alcoholic stimulants such as hot coffee or tea should be given. Throughout the course of his treatment until he has fully regained strength the victim must not use his own physical strength unnecessarily. He is an absolute litter case in the field and an absolute bed case in the hospital.

In the acute stages supportive measures and medications are used. Many physicians claim that atropine has no effect on the pulmonary edema because the air cells are devitalized and the fluid is derived from the blood. They recommend the use of morphine in spite of the early teachings against it, in order to decrease the physical activity, allay fear, and act as a supportive measure to the heart. Cardiac cases, upon their first convalescent days out of bed, must have carefully supervised and graduated exercises which permit the pulse to return to normal within 3 to 4 minutes following the exercise. The period of convalescence will vary from a few weeks to several months.

VESICANTS

Agents. The two common vesicants are *mustard* and *Lewisite*.

Physiological Action. Both mustard and Lewisite are extremely toxic, and in addition to their action as vesicants will, if inhaled, act as powerful lung irritants. Therefore, the use of masks is necessary against the effects of mustard and Lewisite as well as with phosgene and chlorpicrin. Lewisite, by releasing arsenic directly into the blood stream, acts as a powerful systemic poison. Mustard has not this action and in this sense is not considered a poison.

Mustard. Mustard is a heavy, oily liquid, colorless in its pure state but as used commercially is dark colored, having the odor of garlic. Its chemical formula is $(C_2H_4Cl)_2S$. During the World War mustard was the most effective chemical agent, and it produced more casualties than any other agent.

The *physiological action* of mustard is primarily a vesicant. It has the advantage of being toxic in low concentrations before it can be detected by smell. It will penetrate ordinary clothing and affect any part of the body with which it comes in contact. The

first effect noticed is the irritation and inflammation of the eyes and eyelids. Later there occurs an irritation of the respiratory passages with cough, nasal drainage, nausea, and pain in the epigastrium. In this manner it acts as a lung irritant.

The effect on the skin is insidious in that it emulates the reaction of a severe sunburn; the reddening of the skin, itching, and then blister formation. The vapor comes in contact more frequently with the parts of the body that perspire freely, the degree of burn being dependent upon the concentration and the duration of exposure. Liquid mustard naturally causes a more severe injury, a noticeable effect appearing within one hour after contact. These burns create deep necrotic ulcers which heal slowly and require much attention because secondary infection occurs more readily than in the ordinary third degree burn. Mustard is a cell poison, destroying all cells with which it comes in direct contact. Therefore, if it comes in contact with the small capillaries of a wound they are thereafter unable to carry out their mission of repair. The presence of necrotic tissue in the wound and the lack of adequate blood supply form a good culture medium for bacterial infection.

The skin lesions are found wherever contact is made, the severity depending upon the concentration and time of exposure. The face is usually clear if a mask is worn. Where little protection is provided a general burn may cover the entire body with the exception of the area within shoes or around the waistline where the snug belt has afforded some protection. The degree of severity may vary between slight and severe stages of erythema to slight or severe degrees of vesicle formation.

The eyes show a marked catarrhal or a purulent conjunctivitis. There is edema of the mucous membrane of the nose and throat with formation of numerous necrotic patches therein and on the posterior surface of the tongue.

On autopsy the lungs do not collapse but show alternating areas of atelectasis, emphysema, and normal tissue. The vessels are dilated and filled with blood, and there is a diphtheritic false membrane lining the bronchial tree, with exudate plugging many of the smaller bronchi. The right heart may show some dilatation. It is not as marked as in phosgene poisoning. The abdominal viscera show marked passive congestion, and when mustard has been ingested with food there is a necrosis, ulceration, and hemorrhage of the mucosa of the stomach and proximal portions of the small intestine. If this occurs the victim will have symptoms of nausea, vomiting, and diarrhea.

Urinalysis in the majority of cases is negative, although albumen, blood, and casts may be found occasionally. The leucocyte count may rise high the first few days after exposure; if the prognosis is poor it will fall rapidly to a very low figure, usually between the third and sixth days.

To be effective the *first aid* treatment of mustard must be immediate as most of the damage is done within thirty minutes after exposure. Very little can be done thereafter other than to lessen the severity and period of convalescence. The patient must be removed from the area of contamination and his clothing removed or cut away if it has been exposed to mustard vapor. Wherever the odor of mustard can be noted on the skin, every effort to cleanse the surface with a solvent such as kerosene, gasoline (not containing lead tetraethyl), any oil, alcohol, or carbon tetrachloride (pyrene) must be made. Since these substances will themselves cause an irritant action to the skin this cleansing should be followed by bathing in a hot soapy solution to remove the solvent used. It has been found that nothing can be done to lessen the degree of burn already obtained before using the solvent, and it is with this experience in mind that authorities realize the importance of immediate first aid to limit the injury to a hyperemia. If mustard poisoning is anticipated the medical officer should have curative agents of this type available for use at his medical installation. A weak, freshly prepared solution of chloride of lime in water may be used in lieu of oily substances, but it is very irritating to the skin and must be scrubbed off immediately with soap and water.

The liquid burns require repeated swabbing with a solvent after which the wound should be subjected to debridement and thoroughly and frequently cleansed to prevent infections that occur readily and delay healing.

The face, if exposed, requires washing of the eyes and rinsing of the nose and throat with a saturated boric acid, weak sodium bicarbonate, or common salt solution.

When the victim has breathed the vapor, he must be treated as a lung irritant case in addition to that of a vesicant.

Fresh uncontaminated clothing should be provided in all cases.

The continued treatment of a mustard case is dependent a good deal upon whether it is a lung irritant, vesicant, or a case combining both types of disability. Mustard does not produce pulmonary edema and is not fatal except in massive quantities. However, it does render the respiratory surface very susceptible to infection in the manner in which mustard wounds are affected, therefore caution must be taken to reduce infection to a minimum in order to avoid pneumonias. It would not be logical to place a lung irritant mustard case in a ward where upper respiratory or pneumonia cases are present. Masks may be used as filtering agents to avoid infection, using sterilized gauze, assisted by such medications as menthol, eucalyptus, creosote, or similar soothing agents.

The treatment of the skin and burned surfaces is the same as that for ordinary burns with the special consideration that the mustard burn must be kept scrupulously clean, well drained, and frequently redressed, removing necrotic tissue as soon as possible. It has been found that the disfigurements and disabilities of mustard burns represent the majority of the gas disabilities, many of which can be prevented by careful, considerate treatment during the stage of convalescence and by plastic surgery at a later date.

Gastro-intestinal treatment requires a careful control of the patient's diet, remembering the pathological condition of the alimentary mucosa. Soft, bland, and liquid diets must be used to facilitate the restoration of the stomach and intestinal membranes. An adequate and nourishing diet should be provided, and the patient returned to a normal full diet as soon as progress indicates a normal digestive function has been restored.

According to the *Official History of War, Medical Services, Diseases of the War*, vol. II, page 458, 1923, London, "The management of the convalescent provides the great test for the medical officer's ability, because he is required not only to treat the disease, but to restore morale, to cut short hospitalization, and to lift men out of the slough of self-analysis which so often follows gassing. The best results will therefore be obtained by placing gassed cases in selected hospitals under the care of medical officers with special aptitude for this.

"As soon as man is convalescent and free from the danger of septic complications, he should be discharged from the hospital to a convalescent center, where a well-ordered routine of exercise, employment, amusement, and rest will quickly restore him to a state of physical and mental fitness."

Lewisite. Lewisite was first isolated and described by Professor Lewis of Northwestern University, Evanston, Illinois. It was never manufactured in large quantities nor used during the World War. It is a heavy, oily liquid, colorless in its pure state. However, it darkens on standing. The chemical formula is ClCH:CHAsCl_2 .

It has a primary *physiological action* as a powerful vesicant and in addition thereto because of absorption into the general circulation causes a systemic arsenical poisoning, giving rise always to serious and possibly fatal complications.

Irritation of the eyes, nose, and throat commences immediately upon exposure, and its vesicant action is more rapid than that of mustard. The vapor causes an inflammation of the entire respiratory tract, including the smaller bronchi, and a general congestion of the lungs with some edema. The patient will sneeze violently almost at once upon inhalation; the skin effects follow within an hour, and the victim may even become a definite casualty within that period of time.

Liquid burns are more severe than those of the vapor and much more rapid than those of mustard. The exposed individual may become a casualty within 15 minutes. The degree of arsenic absorption and poisoning will vary according to the concentration and amount of chemical in contact.

The *first aid treatment* is similar to that of mustard; however, immediate measures are demanded in order to be of any preventive value. The application of treatment probably will not prevent a burn, but the use of hydrolyzing agents immediately after skin burns will preserve life.

The individual should be removed immediately from the contaminated area and the contaminated clothing or spattered areas of the clothing removed or cut away. If the face was not protected by a mask, the same treatment of washing the eyes and rinsing the nose and

throat with saturated boric acid, weak sodium bicarbonate, or common salt solution as in mustard poisoning can be used. Should the patient have been subjected to high concentration and inhalation of the gas, he must in addition to his treatment as a vesicant casualty be treated and transported as a lung irritant case.

The Lewisite liquid burns, since the chemical contains arsenic, must be treated with some hydrolyzing agent to prevent arsenic absorption. These burns should be treated instantly with a 5 per cent solution of sodium hydroxide. After a thorough application of this, it must be washed off with soap and water, because sodium hydroxide has a severe caustic action on the skin. The patient must be sent to a hospital station, collecting station, or aid station where he can receive simple surgery excision of the burned skin and edematous subcutaneous tissue, provision for free drainage, and suturing of the wound. Ulceration and suppuration with necrotic sloughing will usually occur.

The vapor burns should receive much the same treatment, using a hydrolyzing agent followed by scrubbing with soap and water. A ferric hydrate paste (A smooth paste which takes several days to prepare and which should be available) should be spread on thickly, then covered with sterile gauze and allowed to remain for at least 12 hours. 'Oiled silk, oiled paper, or other impervious dressing may be used for a covering. This treatment in some instances will prevent blistering and the development of a definite burn from Lewisite.

Fresh, uncontaminated clothing should be substituted with the least practicable delay, and after treatment for their immediate needs the burn cases should be transported to rear medical installations. Irritants are treated according to their immediate condition and effect of transportation on their prognosis.

Should an enemy use Lewisite, the medical officer must provide his medical installation with 5 per cent solution of sodium hydroxide (can be secured in ampoules) and impervious ointment boxes or tubes of ferric hydrate paste. Treatment given promptly, even to an otherwise lethal burn, may return the soldier to duty within ten to thirty days. The prolonged treatment for the late treated case is similar to that for the vesicant and lung irritant type of mustard case, with the increased possibility and complication of arsenic poisoning. The patient receiving a fatal dose is, however, a complete casualty within several hours. Arsenic is excreted in the urine, and on autopsy it has been found in all the tissues of the body with heavy concentration adjacent to the burned areas. Conclusion as to the prognosis of the case of Lewisite poisoning can therefore be drawn from the concentration of the chemical contact and the promptness of the proper first aid measures.

LACRIMATORS

Agents. Those agents which are lacrimators only are *chloracetophenone* and *brombenzylcyanide*. The only effect tactically and to the medical personnel is to cut down the efficiency of operation by necessitating the constant wearing of the mask and the annoyance of excessive lacrimation if protection is not used. Casualties would not occur except in extremely high concentration.

Brombenzylcyanide. Pure brombenzylcyanide is a yellowish white, crystalline solid. The chemical formula is $C_6H_5CHBrCN$. Commercially it contains impurities and is a heavy, oily, dark brown liquid. It is very stable and, because of this characteristic, is very persistent, adhering to the earth's surface for as long as 30 days.

The *physiological action* of brombenzylcyanide is important tactically because of the intense irritation of the eyes, with profuse lacrimation, causing temporary blindness on exposure to high concentrations. In the field concentration there is no other effect; and, except for the differentiation of that case from other types of more toxic gases which also have a lacrimatory action, it presents no dangerous problem.

First aid treatment will suffice completely for this type of gas patient, and there is no need for evacuation. The individual should get out of the affected area, going towards the direction from which the wind is blowing. The clothes should be changed and thoroughly aired, if possible. If change is impracticable the clothes should be loosened to permit ventilation. If the individual has rubbed his eyes, which in some instances is difficult to prevent, bathing the eyes with cold water or weak solutions of boric acid

or sodium bicarbonate solution will relieve a good deal of the discomfort. The patient will also feel that something is being done for him, and the passage of time will improve his condition.

Chloracetophenone. Pure chloracetophenone is a white crystalline solid which can be melted into shells and candles. It is commonly known by the public as *tear gas*.

The *physiological action* of chloracetophenone is an intense irritation of the eyes, with profuse lacrimation and a mild burning on the skin. Inhalation will cause considerable discomfort and irritation of the throat. If the concentration is high there is irritation sufficient to cause conjunctivitis and inflammation of the eyes that may take 24 hours or more to relieve.

If chloracetophenone is applied directly to the skin it may result in vesiculation, especially of the tender skin. It will heal in the usual manner of a burn when treated aseptically.

First aid *treatment* will be sufficient for the ordinary case. Getting out of the contaminated atmosphere will bring almost immediate relief. The eyes will be made more comfortable by washing them with a cold solution of boric acid or sodium bicarbonate. The clothing should be freed of gas by airing. If the gas mask has become contaminated and it is necessary to continue operation in a contaminated area, a new mask should be secured, putting it on while in a clear atmosphere.

IRRITANT GASES OR SMOKES

Agents. These agents, called *sternutators*, are *diphenylchlorarsine* (D.A.) and *diphenylaminechlorarsine* (D.M.).

Physiological Action. On exposure to the toxic action of these compounds, except for minor differences, similar physiological effects are experienced. These effects usually appear as follows: an intense irritation of the eyes and nose, excessive lacrimation from the eyes and a profuse watery discharge from the nose, a feeling of suffocation and constriction of the chest, sneezing and coughing, nausea and vomiting, and lastly but indeed not least a terrific splitting-type headache. Occasionally there is a feeling of pain in the stomach and numbness of the limbs, which some patients claim changes to extremely sharp pains. They develop such a mental state of despair that they would rather die than continue to suffer such extreme agony. The results from D.M. are more severe and persistent than those of D.A. Under field conditions no lethal dose of either of these gases would be used. The incapacity of the patients lasts only a few hours, and the victims are able to return to duty within 24 to 48 hours. The diagnosis is relatively easy unless complicated with lung irritant gases.

Treatment. Treatment consists of leaving the contaminated area, removal of the contaminated clothes, rest, and fresh air. The nose and throat should be washed with a saturated solution of boric acid or normal saline solution. The exposed surfaces of the body should be washed thoroughly with soap and water. Ammonia inhalation brings some relief from the nausea. Breathing chlorine seems to alleviate the irritation to the upper respiratory passages. A mixture of chloroform, ether, and alcohol, or bleach lime in a bottle, will furnish sufficient chlorine for the purpose. Coal tar derivatives such as aspirin and phenacetin decrease the severe headache somewhat; if not sufficient they may be supplemented with a moderate dose of morphine. Symptomatic treatment is all that is usually necessary, and no permanent disabilities will result. However, it will often be necessary to evacuate the patients to the rear for a period of at least 48 hours before they are fit mentally and physically to perform their duties.

PARALYSANTS

Agents. The paralytant agent of chemical warfare is hydrocyanic acid. Carbon monoxide is also a paralytant, and is encountered as the result of incomplete combustion of explosives.

Hydrocyanic Acid. This prussic acid, as it is generally known, is one of the most dangerous poisons known to man. Although impracticable in war, an attempt was made during the World War to use it, and therefore it may be tried again. In industrial

plants and laboratories its use requires the doctor to be prepared for immediate first aid measures.

The *physiological action* of hydrocyanic acid is directly due to the powerful toxic action upon the nervous system. The action begins in the medulla, stimulating the vomiting, respiratory, vagus, and vasomotor centers. Its action is extremely rapid, the victim becomes unconscious, has convulsions, has complete paralysis of the nervous system, followed by asphyxiation and death. In high concentrations death is almost immediate.

In dilute concentration the patient has a sensation of constriction of the throat, an unpleasant taste in his mouth, senses an odor of almonds, and has mental confusion, faintness, dizziness, palpitation, and labored respiration.

Because of the extreme rapidity with which hydrocyanic acid acts, only *first aid treatment* immediately instituted can be given. The patient must be quickly removed from the contaminated atmosphere. If this is done immediately or before he drops to the ground, he will usually recover even though there is a transitory stage of paralysis of the lower extremities. Artificial respiration should be given immediately, including the use of respiratory stimulants such as inhaling ammonia fumes. Amyl nitrite pearls should be crushed and inhaled, and caffeine and intravenous respiratory stimulants used. If death does not occur within an hour complete recovery can probably be anticipated. When the normal respiration is resumed the ill effects will soon pass off. It should be remembered especially that removal of the patient to fresh air and the use of artificial respiration is the most valuable treatment.

Carbon Monoxide. Knowledge of this agent is common to all doctors and presents no new problem. It is purely a gas, encountered in numerous places in ordinary daily life, i.e., illuminating gas, automobile exhaust fumes, and in coal damp of coal mines. Although not used as a chemical warfare agent, medical officers will encounter it in war and will have cases of carbon monoxide poisoning, caused by the presence of carbon monoxide in the areas of shell explosions.

The *physiological action* of carbon monoxide is due to its peculiar affinity for hemoglobin. It is greater than its affinity for oxygen. Therefore, upon inhalation the carbon monoxide usurps the place of the oxygen in the blood with the result that after a time the carbon-monoxide-hemoglobin will be so increased that the body tissues will be starved for the want of oxygen. Toxicity begins at .05 per cent, and unless the patient is removed from the presence of carbon monoxide the amount of CO-hemoglobin will rise steadily. This compound is very stable in the blood stream, causing it to take on a cherry-red color which is an indication of its presence. The onset of symptoms is insidious, but if the concentration increases rapidly unconsciousness quickly develops. After unconsciousness, the breathing becomes stertorous, the skin appears cyanotic, later to be followed by pallor, coma, convulsions, and death.

The *treatment* of carbon monoxide poisoning has been under investigation and experiment for many years. There are certain measures which have proved proper and seem to be beneficial. Artificial respiration should be given at once, using the Schäfer method. If carbon dioxide is available it should be given to stimulate the respiratory center. This should be increased until the normal respiratory movements are established. Do not discontinue this treatment even after the patient returns to consciousness for at least a half hour. The patient should be kept warm and at absolute rest.

Recovery is very slow. The relief from the acute stage may require several days to weeks. There may be a persistent headache, amnesia, insomnia, and varied other nervous disturbances. Many have advocated the use of methylene blue, intravenously, and other medicaments and measures; however, artificial respiration aided by carbon dioxide as a respiratory stimulant has proven the most effective.

Evacuation to field hospitals should begin after all danger of relapse is over. The care during transportation will depend upon the condition of the patient. They should be litter cases even if their condition is not considered serious.

INCENDIARIES

Agents. The incendiary agents are *white phosphorus*, *thermits*, and *solid oils*.

Physiological Actions. Incendiary agents, except for white phosphorus, present no

more uncommon complications than do ordinary types of burns. However, white phosphorus continues to burn as long as there is oxygen available and produces a great deal of heat. An explosive shell in which there is phosphorus might imbed some of the phosphorus particles deep into the flesh, and as long as oxygen is available it would continue to burn. In addition, if phosphorus is transmitted by a projectile in a quantity sufficiently great, enough of the phosphorus may be absorbed to produce phosphorus poisoning. This would be rare. The most serious action is the production of deeply burned ulcers, causing a great deal of pain and healing very slowly.

Treatment. The injuries arising from thermites and solid oils are treated as the ordinary type of burns.

Immediate treatment of a white phosphorus burn consists of stopping the phosphorus particles from burning. This is accomplished by immersion in water, cooling the phosphorus, and then removing it from the tissue. Its low melting point of 112 degrees Fahrenheit (44 degrees Centigrade) permits the area to be immersed in warm water and the phosphorus removed under the water, using a sponge or forceps. A one per cent solution of copper sulphate in water, if available, should be applied to the burned area at once. The copper sulphate solution combines with the phosphorus, forming a metallic coating of copper phosphides around the phosphorus particles which prevents the access of the free phosphorus to oxygen. The phosphorus will stop burning, and the particles can be picked out of the tissues. The copper sulphate solution can be applied with a sponge or cloth, sopping it on the phosphorus for several minutes until the metallic coat forms. The serious burn cases should be evacuated as soon as possible, using care to maintain asepsis as much as possible. Thereafter treatment will be the same as the ordinary care for chemical burns.

FIRST AID FOR GAS CASUALTIES

Many troops will experience the difficulties of chemical warfare without the presence of a medical officer to care for their needs. It will be necessary on these occasions for the responsible authorities to take over the treatment of these cases until the medical officer's service can be obtained. It is with this in view that the abbreviated treatment of common chemical poisons and the accompanying chart are included herein. The doctor who is not accustomed to the treatment of gas casualties in his daily practice might find need to refer to these first aid principles until he has time to acquaint himself with the specific and complete treatment of gas casualties.

The following information is extracted from par. 32, *a* and *b*, A.R. 30-1270.

Treatment in General for Gas Casualties. The following suggestions are offered as a guide for the administration of first-aid treatment to persons suffering from exposure to corrosive chemicals, chemical warfare gases, liquids, and solids. It must be realized the sooner first-aid treatment is administered to those exposed the better will be their chances for early recovery. *There must be no delay; quick action is essential.* Although each gas or chemical produces certain conditions requiring special treatment, there are certain first-aid principles applicable to all, which, if applied early, will give relief. These principles are expressed in the following requisites and procedure:

Requisites.

- Fresh air.
- Rest.
- Warmth.
- Careful attention.
- Neutralization of the chemical.

Procedure.

- Remove the patient immediately from the gas-infected area to a pure atmosphere, preferably in the open air.
- Remove the outer gas-infected clothing as soon as possible and substitute covering to keep the patient warm.
- Wash the exposed body surfaces with water to remove the chemical. If the patient is suffering from phosphorus burns it is very important to keep the burned areas covered with water.

If the patient has inhaled large quantities of phosgene, chlorpicrin, chlorine, or any other of the lung irritants, keep him in a reclining position and do not permit him to talk.

Send immediately for an ambulance or other form of transportation to convey the patient to a hospital or aid station where he can receive proper attention.

Treatment in Case of Special Gases.

Chloracetophenone (C. N.), $C_6H_5COCH_2Cl$.

Treatment. In most cases removal of patient to a pure atmosphere will be sufficient.

In the more aggravated cases or those exposed to a strong concentration of the gas, washing the eyes with a saturated solution of boric acid will be beneficial.

Do not rub the eyes nor bandage them.

Brombenzylcyanide (C. A.), $C_6H_5CHBrCN$.

Treatment. Remove the patient to a pure atmosphere. Use saturated solution of boric acid. Treatment similar to that described for C. N.

Cyanogen chloride (no symbol), $CNCl$.

Treatment. Remove patient to pure atmosphere. For the eyes apply same treatment as for C. A. and C. N. For skin injuries apply sodium bicarbonate wash as quickly as possible. Remove all splashed clothing, as the fumes are dangerous, and apply wet packs saturated in sodium bicarbonate 10 per cent. Follow with alkaline sodium hypochlorite 20 per cent to prevent infection. Keep patient in the open air until all odor of $CNCl$ is gone.

Diphenylaminechlorarsine (D. M.), $(C_6H_5)_2NHAsCl$.

Treatment. Chlorine gas treatment when possible. If impossible to use chlorine treatment, wash the exposed body surfaces with water. After drying apply alkaline bicarbonate 20 per cent hypochlorite solution. (Most of the arsenical war gases are oil soluble, necessitating thorough washing of the skin with alkalis or organic solvents, or weak alcoholic sodium hydroxide.) The more thorough the washing the less serious the rash will be.

Diphenylchlorarsine (D. A.), $(C_6H_5)_2AsCl$.

Treatment. Same as for D. M.

Chlorine (C. L.), Cl_2 .

Treatment. Remove patient immediately to pure atmosphere. Keep patient quiet and warm. If possible give patient cup of cream or milk. Spray throat with alcohol. Give light stimulant or hot coffee from time to time if possible.

Phosgene (C. G.), $COCl_2$.

Treatment. For light concentrations, treatment same as for chlorine. Strong concentrations very dangerous. Remove patient to hospital at once. Keep patient quiet and in a recumbent position. Give light stimulants. *Absolute quiet, warmth, and oxygen very essential.*

Chlorpicrin (P. S.), CCl_3NO_2 .

Treatment. Remove patient to pure atmosphere. Keep him quiet and in a recumbent position. Apply warmth. Give light stimulants. In case of splashes of liquid on skin wash off with alcoholic disodium sulphite at once to prevent ulcerations. Skin scratches and abrasions exposed to chlorpicrin fumes may become greatly irritated with the formation of abscesses.

Mustard (H. S.), $(C_2H_4Cl)_2S$.

Treatment. Early bathing to wash off mixture. Hypochlorites react violently with mustard, and sulphoxide is formed. Chlorine likewise attacks mustard, producing a higher chlorinated compound which is nontoxic. The eyes, nose, and throat should be cleaned well with a 2 per cent alkaline sodium bicarbonate solution.

In case of skin symptoms wash the skin continuously with running water. If possible apply carbon tetrachloride, saturated with chlorine, or wash with strong alkaline sodium hypochlorite. The more thoroughly the skin is washed to remove mustard the less will be the injury. Do not use dry bleach on mustard as the heat of the chemical reaction will produce severe burns when the chlorine combines with the mustard liquid. As soon as possible wash affected part with an organic solvent such as benzene, chloroform, or ether. After thorough drying

SYMPTOMS AND FIRST AID TREATMENT OF CASUALTIES CAUSED BY EXPOSURE TO CHEMICAL AGENTS

SYMPTOMS IN ORDER OF SEVERITY	TYPE OF AGENTS	AGENT	SPECIAL PECULIARITIES	TIME OF APPEARANCE OF SYMPTOMS	FIRST AID TREATMENT (par. 35-40, FM 21-40)
Irritation of eyes Copious flow of tears Blindness (temporary)	LACRIMATORS	Chloracetophenone Brombenzylcyanide Chloro-perin (ordinary field concentration)	Burning sensation on skin May cause vomiting	Immediate Immediate Immediate	Remove temporarily from gas atmosphere; have man face wind. He should not rub his eyes. Bathe eyes with boric acid solution or bicarbonate of soda solution or even plain cold water helpful. Symptoms shortly disappear. Do not evacuate.
Irritation nose and throat Watery discharge from nose Coughing Pain at base of nose Severe headache Nausea Mental and physical depression	IRRITANT GASES (Sternutators)	Diphenylchlorarsine Diphenylaminechlorarsine		Irritation immediate; other effects may be delayed 30 minutes or longer	Put man at rest, loosen clothing; bathe nose and throat with salt water or bicarbonate of soda solution. Breathing chlorine as given off from bottle of chloride of lime beneficial. Keep away from heat. The exposed surface of the body should be washed with soap and water. Mild cases need not be evacuated; more serious cases should be.
Burns on body	INCENDIARIES	White Phosphorus Thermits and solid oils	Burning particles adhere to flesh Cause heat burns—set fire to clothing	Immediate	Immerse affected part in water to stop burning of phosphorus and pick out phosphorus particles from flesh. Apply mud or damp earth as temporary expedient if water not available. If copper sulfate solution available, apply immediately. It forms coating over phosphorus particles; stops their burning and makes them readily visible so that they may be picked out. Evacuate severe cases. Other incendiaries—Treat as any ordinary burn—bandage.
Irritation nose and throat Coughing Difficult breathing Pains in chest Retching—vomiting Strangulation Blue pallor—lips, ear lobes Grayish pallor face	LUNG IRRITANTS	Chlorine Chlorpicrin (high concentration) Phosgene	Intense irritation of throat; coughing violent Lacrimation and vomiting Non-irritating except in high concentration	Immediate Usually immediate Often delayed Delayed	Remove man from gas atmosphere; loosen clothing; keep at absolute rest lying down; do not allow to walk; keep warm with blankets, hot water bottle, etc.; give non-alcoholic stimulants—hot coffee or tea; administration of oxygen frequently required in severe cases; evacuate to aid station as soon as possible.
Eye Effects Irritation Inflammation of lids Inflammation of cornea Blindness (usually temporary; rarely permanent)	VESTICANTS*	Mustard Gas	Skin burns not painful; no effect noticed when exposed to gas, hence its insidious character.	Vapor—2 to 6 hrs. Liquid—15 min. to 1 hr.	If face has been exposed to either mustard or Lewisite vapor, bathe the eyes, nose and throat with solution of boric acid, bicarbonate of soda or common salt; and if vapor has been breathed, treat and handle as for lung irritant casualty. Skin burns: Mustard vapor—Immediate soap and water bath may prevent or lessen casualties; but no treatment is of much value after long exposure to vapor. Mustard liquid—Swab affected area repeatedly with oily solvent, such as kerosene, straight gasoline (not containing lead tetraethyl), lubricating oil or carbon tetrachloride (pyrene),—using

Skin Effects Redness or rash Intense itching Blisters Ulcers Granulation and sloughing of tissue	Lewistite	Vapor causes sneezing, often at once. Liquid—Burns first appear as grayish spots. Burns not painful. Secondary effects—arsenic poisoning	Delayed—15 min. to 1 hr.	fresh cloth or cotton for each swabbing. Then follow with thorough scrubbing with soap and water. (Weak solution of chloride of lime, or "bleach," may be used instead of oily solvent; but this solution is irritating, and must be removed in subsequent washing). Lewistite vapor—Scrub thoroughly with soap and water; and apply dressing of ferric hydrate paste. Lewistite liquid—Apply hydrolyzing agent, such as 5% solution of sodium hydroxide (caustic soda); scrub thoroughly with soap and water; and apply dressing of ferric hydrate paste. Supply fresh uncontaminated clothing and evacuate all casualties from any vesicant as soon as possible.
Faintness, dizziness, dryness of throat, rush of blood to head, unconsciousness, death.	PARALYSANTS	Hydrocyanic acid gas	HCN even in low concentration usually fatal in few minutes.	Respiration is one vital requirement. Remove patient to pure atmosphere and begin artificial respiration immediately. Dashing cold water on face and chest may help to restore breathing. If available, and during artificial respiration, have patient breathe fumes of ammonia or of amyl nitrite. Additional oxygen not necessary).
Blurring of sight, weakness of knees, roaring in ears, pain in stomach, sweetish taste, muscular weakness, unconsciousness, failure of respiration, death. Cyanosis; and usually bluish or red spots on skin.		Carbon monoxide	CO being odorless is frequently not detected in time to avoid it. Generally fatal.	Remove patient to pure atmosphere, and if breathing has ceased, begin artificial respiration immediately. Dashing cold water on face and chest may help to restore breathing. Additional oxygen vitally necessary; and, if available, administer oxygen-carbon dioxide mixture. Watch out for relapse.

*NOTE: All the vesicant agents are extremely toxic. If breathed, they cause severe inflammation of the lungs likely to result in bacterial infection and pneumonia. For effects of breathing, First Aid as prescribed for lung irritants should be rendered.

TABLE I

wash again with hot soapy water or alkaline solutions to be followed by hourly treatments of an alkaline bicarbonate hypochlorite solution.

Lewisite (M-1), (ClCH:CHAsCl_2).

Treatment. Similar to that described for mustard.

White phosphorus (W. P.).

Treatment. First immerse parts in water. Then apply in large amounts a 1 per cent copper sulphate solution. Continue this for 3 minutes. Remove the phosphorus particles and treat like an ordinary burn.

Carbon monoxide (no symbol), CO.

Treatment. Removal of patient to pure atmosphere, as soon as possible. He should be wrapped in blankets and kept at absolute rest thereby retaining the oxygen in the body. Oxygen should be administered as soon as possible. If breathing is shallow apply artificial respiration.

Hydrocyanic acid (no symbol), HCN.

Treatment. Acts so rapidly that little can be done. Immediate removal to fresh air.

Artificial respiration. Administration of oxygen. Apply friction.

Ammonia (no symbol), NH_3 .

Treatment. Immediate removal from poisonous atmosphere. Artificial respiration.

Inhalation of steam.

EVACUATION OF GAS PATIENTS

It is the plan of the Medical Department of the United States Army that gas casualties can be treated at any of its medical installations in the theater of operations, there being provisions for the segregation of these cases immediately upon their reception. In the battalion aid stations, regimental aid stations, and collecting stations decision must be made by the medical officer whether the case should be evacuated to the rear or retained at the installation. First aid treatment only can be given here. If the patient can be transported to a clearing station he will then receive more comprehensive treatment. All pulmonary edema cases will be transported in the recumbent position. Transportation will be by litter and by an ambulance which handles only gas casualties, the operating personnel being provided with the necessary protective clothing and masks.

Upon arrival at any hospital in the theater of operations, gas cases go through a process of sorting, bathing, and assignment to the proper ward for gas patients. When possible the slightly gassed are separated from the more serious cases. Cases of mustard patients are also separated from those suffering from pulmonary edema. In some instances the reception of cases might be of such numbers as to necessitate the designation of an entire clearing station for their care.

The clearing stations in the theater of operations are necessarily mobile and must follow the tactical forces; therefore careful selection is made of the patients for disposition, each case being considered with judgment and discretion as to his prognosis. All slightly gassed cases who are expected to recover completely in a few days are kept in the mobile hospital and returned to the front on recovery. Cases which have been seriously gassed by mustard are evacuated to the rear as soon as their temporary needs have been provided. They go through the evacuation hospital and then to a general hospital. When their recovery is assured they are transferred to a convalescent camp. The early evacuation of the mustard case is carried out because mustard does not cause acute pulmonary edema and therefore does not present the difficulty of transportation as do phosgene cases.

Those cases which are the result of lung irritants must be kept at the sites of reception where possible for a period of 48 hours until their maximum illness is over and until they no longer require oxygen therapy. This site will normally be the clearing station. They are then transported in the supine position with as little discomfort as possible to a general hospital in a hospital center, and later on, after more complete recovery, to the convalescent camps. Here they remain until they recover completely. After graduated exercises and other therapeutic measures which are found to be beneficial, some become sufficiently healthy and strong to be able to return to their organization for further service.

Rail or water transportation is used whenever available for evacuating the pulmonary

edema cases in order to provide them with the greatest comfort and avoid any unnecessary physical exertion on their part. It is difficult for the patient to realize his condition until he is out of breath and unable to carry on any physical activity, therefore he must be informed about the danger of disobeying orders regarding his transportation. This type of case should remain on the litter from the time he becomes a patient until he arrives at the hospital where he is to receive permanent care.

The remainder of the cases can be transported and evacuated in the same manner as the traumatic cases resulting from the normal weapons of war. Evacuation of the strictly gas patient requires careful handling and classification of the patients, adding a very heavy burden to the evacuation system. Because of this fact gas warfare will not be entirely welcome to the Medical Department personnel in the theater of operations, even though the actual deaths are less in proportion than those from other causes.

Part III :

Medical Tactics and Administration

CHAPTER I

ATTACHED MEDICAL PERSONNEL WITH UNITS OF THE INFANTRY AND CAVALRY DIVISIONS

Introduction. This chapter deals with the duties of those members of the Medical Department who are designated in War Department Tables of Organization as "attached medical personnel." Each major component of the infantry and cavalry divisions, as well as other organizations, is furnished a fixed quota of officers and men of the Medical Department who, in the usual case, are referred to collectively as the Regimental Medical Detachment. This personnel accompanies the unit to which attached in all tactical operations, functions under the immediate control of its commander, and is not to be confused with the medical regiment, medical battalion, or medical squadron which forms a part of the infantry or cavalry division as an organic unit.

In our Army the scheme of evacuation provides that men who become battle casualties receive their first treatment at the hands of the attached medical personnel. For this reason it has been truly said that they form the very backbone of the medical service available to combat divisions.

The strength, organization, and method of operation of attached medical personnel varies according to the nature and organization of the unit to which it is attached. The discussion of the organization and functions of the division medical regiment, or equivalent units, is presented in Chapter II. In this chapter, for purposes of convenience and ready reference, the discussion of attached medical personnel is presented for various types of divisional organizations in the order listed below.

Detachments with Units of the Infantry Division, "Square."

Detachments with Units of the Infantry Division, "Triangular."

Detachments with Units of the Cavalry Division.

The Interior Economy of the Attached Medical Personnel.

Duties of Commissioned Personnel.

Employment of the Attached Medical Personnel with Infantry.

Employment of the Attached Medical Personnel with Units other than Infantry.

Organization and Functions of the Regimental Medical Detachment. General. The regimental medical detachment is organized as follows:

Headquarters section.

One battalion or squadron section for each battalion or squadron of the regiment.

Veterinary sections for organizations having animals.

The *headquarters section of the medical detachment* is organized to provide administrative, supply, and communications service for the battalion medical sections. Its usual organization includes the regimental surgeon, the assistant regimental surgeon, two dental surgeons, and such enlisted personnel as the surgeon may deem necessary. The regimental surgeon is the senior medical officer. He directs and supervises the medical and dental services of the regiment and coordinates the veterinary services through the veterinarian in the organizations having animals. When necessary the headquarters section establishes and maintains a regimental aid station and dispensary for the care and treatment of troops located in the vicinity of regimental headquarters. It replaces the battalion or squadron medical section when it is necessary to keep them mobile or to permit them to keep contact with the unit supported.

The *battalion or squadron section* of which there may be one or more, is designed to function as a tactical unit. It consists of the battalion surgeon, the assistant battalion surgeon, and available enlisted personnel. In general, the total enlisted strength of any battalion or squadron section is approximately twice the strength of the headquarters section.

DETACHMENTS WITH UNITS OF THE INFANTRY DIVISION, "SQUARE"

The Regimental Medical Detachment with Infantry. The medical detachment with an infantry regiment consists of 10 officers and 96 enlisted men. It is divided into a headquarters section and 3 battalion medical sections. (See Plates 1 and 2.)

Headquarters section. The headquarters section consists of the regimental surgeon (major), the assistant regimental surgeon (captain), 2 dental officers (captains or first lieutenants), 1 technical sergeant, 1 sergeant, and 13 privates first class or privates.

The technical sergeant is the senior noncommissioned officer with the detachment. He attends to the routine administrative details of the regimental medical detachment as a whole.

The sergeant is in direct charge of mess and supply functions. If a regimental aid station is established he is an assistant dresser.

The 13 privates first class or privates are sanitary, medical, surgical and dental assistants, clerks, messengers, chauffeurs, motorcyclist, and orderlies.

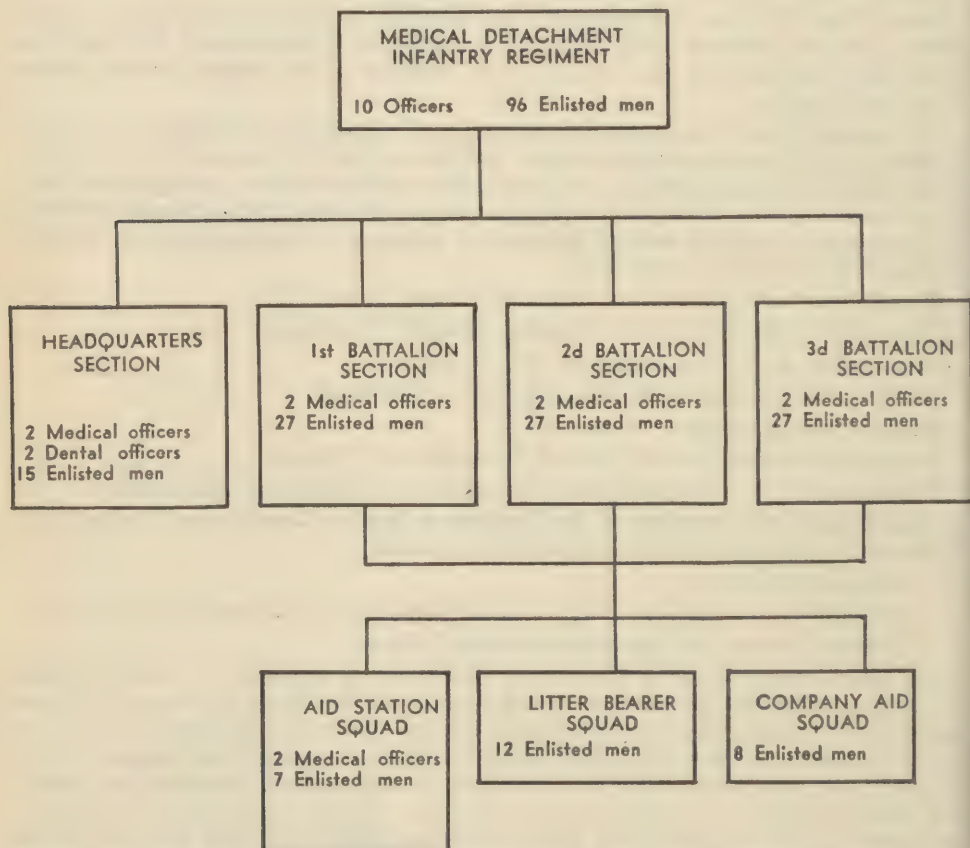


Plate 1. Organization of the Regimental Medical Detachment with an Infantry Regiment.

The equipment, new pattern (97300), of the headquarters section consists of:

- 1 Chest, Medical Department, No. 1 (97565).
- 1 Chest, Medical Department, No. 2 (97570).
- 1 Chest, Medical Department, No. 4 (97575).
- 1 Water sterilizing set (97940).
- 1 Lantern set (99547).
- 1 Splint set (97815).

1 Cocoa unit (99357).

1 Tent, pyramidal, large, complete with fly, pins, and poles.

1 Case, tent pins (97515).

1 Blanket set, small (97465).

6 Litters, aluminum pole (99549) or 6 litters, wooden pole (78440).

Miscellaneous:

1 Axe, handled, chopping, single bit, standard grade, 4-pound.

1 Pick, handled, railroad, 6-to 7-pound.

1 Shovel, hand, D-handle, round point.

3 Buckets, general purpose, galvanized without lid, 24 gauge, 14 qt.

1 Flag, Geneva Convention (Red Cross) marker, with case and staff.

1 Rope, ½-inch, 40 feet.

Dental Dispensary equipment:

1 Chest, Medical Department, No. 60 (95025).

The transportation of the headquarters section of an infantry regiment consists of:

1 motorcycle with side car.

2 1½-ton cargo trucks.

2 ½-ton, command and reconnaissance trucks.

The medical personnel is transported in the organic transportation; the regimental surgeon rides with the regimental staff.

	1	2	3	4	5	6
	Unit	Spe- cialists' ratings (class)	Head- quar- ters sec- tion	3 bat- talion sec- tions each	Total detach- ment	Remarks
1						
2	Major.....		1		1	d Dental.
3	Captain.....		(d 1) 2	1	(d 1) 5	
4	First lieutenant.....		d 1	1	(d 1) 4	
5	Total commissioned.....		4	2	(d 2) 10	
6	Technical sergeant.....		1		1	Summary of specialists' ratings
7	Staff sergeant.....			1	3	
8	Sergeant.....		1		1	Class
9	Corporal.....			1	3	
10	Private, first class.....		13	25	29	Number
11	Private.....				59	
12	Chauffeur (245).....	5th	(2)	(2)	(8)	3d.....
13	Chauffeur (245).....	6th	(2)	(2)	(8)	4th.....
14	Clerk, record (055).....	5th	(1)		(1)	5th.....
15	Litter bearer.....			(10)	(30)	6th.....
16	Motorcyclist (678).....	6th	(1)		(1)	Total.....
17	Technician, dental (067).....	5th	(2)		(2)	
18	Technician, medical (123).....	4th	(1)	(1)	(4)	The serial number sym- bol shown in parentheses is an inseparable part of the specialist designation. A number below 500 refers to an occupational special- ist whose qualification analysis is found in sec. I, AR 615-26. A number above 500 refers to a mili- tary occupational spe- cialist, listed in sec. II, AR 615-26.
19	Technician, medical (123).....	5th		(2)	(6)	
20	Technician, medical (123).....	6th		(2)	(6)	
21	Technician, sanitary (196).....	5th	(1)		(1)	
22	Technician, surgical (225).....	3d	(1)		(1)	
23	Technician, surgical (225).....	4th		(1)	(3)	
24	Technician, surgical (225).....	5th	(2)	(2)	(8)	
25	Basic (521).....			(3)	(9)	
26	Total enlisted.....		15	27	96	
27	Aggregate.....		19	29	106	
28	Q Motorcycle, with side car.....		1		1	
29	Q Truck, ½-ton, command and recon- naissance.....		2		2	
30	Q Truck, ½-ton, weapon carrier.....			4	12	
31	Q Truck, 1½-ton, cargo.....		2		2	

Plate 2. T/O 7-11. Regimental Medical Detachment of an Infantry Regiment.

Battalion medical section. One battalion medical section is provided for each battalion of the infantry regiment. Each such section consists of the battalion surgeon (usually

a captain), the assistant battalion surgeon (usually a first lieutenant), a staff sergeant, a corporal, and 25 privates first class or privates. The battalion section is further divided into:

An aid station squad.

A litter bearer squad.

A company aid squad.

The *aid station squad* (or group) consists of 1 staff sergeant, 1 corporal, and 5 privates first class or privates.

The staff sergeant is in charge of the enlisted personnel and is a surgical assistant and dresser. He may be placed in charge of the property, the exchange of medical and surgical supplies, water purification at the aid station, and the preparation of hot stimulants.

The corporal is an assistant dresser, has charge of the sterilization of instruments, the giving of antitetanic serum and other hypodermic medication (under the immediate supervision of the medical officer in charge of the station).

One private first class or private is assigned to clerical duties. He prepares and keeps the station blotter, which gives all the required information concerning the cases which pass through the station.

Four privates first class or privates are chauffeurs of the trucks assigned to the battalion medical section. They can be used for general utility purposes around the aid station or wherever their services are required.

The *litter bearer squad* (or group) consists of 12 privates first class or privates. In garrison or camp this squad is chiefly employed in and about the camp dispensary or station hospital. In combat the members of this squad function as litter bearers, carrying wounded by hand or wheeled litters from the company areas to the battalion aid station. They operate within the zone of action to which assigned, locating the men who have become casualties. Necessary first aid to permit evacuation by litter and tagging of casualties who were not attended by the company aid men are accomplished. They remove all seriously wounded promptly from the field to the aid station, direct and assist the walking wounded to the aid station, and assist the aid station squad in moving and reestablishing the aid station. They also act as a channel of communication between the company aid men and the battalion surgeons and vice versa.

The litter bearer squad (or group) may be divided into 3 four-bearer litter squads or 6 two-bearer litter squads. Each squad carries a litter. Each litter bearer has two pouches containing bandages, first aid packets, adhesive plaster, iodine swabs, a small instrument case, and a book of emergency medical tags. Leg or arm splints are sometimes carried to care for fracture cases previously located.

The *company aid squad* (or group) consists of 8 privates first class or privates, 2 being assigned to each lettered company. They follow their respective companies in battle, administering immediate first-aid treatment. They tag the sick, wounded, and dead. They direct the walking wounded to the aid station, indicating the shortest and safest routes thereto. They facilitate the work of the litter bearer squads by marking the location of seriously wounded or moving them to locations, sheltered and in defilade if possible, where they may be found and evacuated more readily. The company aid men send information to the battalion surgeons relative to the tactical situation near the front line, locations of wounded, and useful information by messages carried by the litter bearers or walking wounded.

Each company aid man is equipped with two pouches containing bandages, first aid packets, adhesive plaster, iodine swabs, a small instrument case, and a book of emergency medical tags.

The *equipment, new pattern (97205)*, of a battalion medical section of the infantry battalion consists of:

- 2 Chests, Medical Department, No. 1 (97565).
- 1 Chest, Medical Department, No. 2 (97570).
- 1 Water sterilizing set (97940).

- 2 Lantern sets (99547).
- 2 Splint sets (97815).
- 2 Cocoa units (99357).
- 1 Tent, wall, small, complete with fly, pins, and poles.
- 1 Case, tent pins (97515).
- 2 Blanket sets, small (99098).
- 12 Litters, aluminum pole (99549), or 12 litters, wooden pole (78440).

Miscellaneous:

- 2 Axes, handled, chopping, single bit, standard grade, 4-pound.
- 2 Picks, handled, railroad, 6- to 7-pound.
- 2 Shovels, hand, D-handle, round point.
- 2 Ropes, ½-inch, 40 feet.
- 2 Flags, Geneva Convention (Red Cross) marker, with case and staff.
- 2 Buckets, watering, canvas, 18-quart.
- 2 Covers, load, heavy canvas.

The *transportation* of the battalion medical section of the infantry battalion consists of four ½-ton weapon carrier trucks. The company aid men ride on the transportation of the company to which they are assigned. The trucks normally assigned to the battalion medical section transport the personnel and medical equipment of the section. The unit surgeon rides with the battalion headquarters.

The Regimental Medical Detachment with Artillery. General. The regimental medical detachments with artillery are organized in accordance with the functions and composition of the unit served. Each artillery regiment has a medical detachment which is an integral part of its organization. The transportation furnished the medical detachment is such that contact can be maintained with the unit served.

The Regimental Medical Detachment with the Artillery Regiment, 75-mm Gun. (Horse-Drawn). The regimental medical detachment with an artillery regiment, 75-mm gun, (horse-drawn), is divided into a headquarters medical section, 2 battalion medical sections, and 2 battalion veterinary sections. (See Plate 3.)

Headquarters section. The headquarters section consists of the regimental surgeon, the assistant regimental surgeon, 2 dental officers, 1 technical sergeant, a sergeant, and 9 privates first class or privates. The assignments and duties of commissioned and enlisted personnel are analogous to the assignments and duties of like personnel in the headquarters section of the medical detachment with an infantry regiment.

Battalion medical section. Each battalion medical section consists of a battalion surgeon, an assistant battalion surgeon, a staff sergeant, a corporal, and 14 privates first class or privates. It is divided for functional purposes into:

An aid station squad.

A litter bearer squad.

A battery aid squad.

The duties of the battalion and assistant battalion surgeons, aid station squads, litter bearer squads, and battery aid squads are analogous to the duties performed by such officers and such squads serving with battalions of infantry.

The *aid station squad* consists of a battalion surgeon, 1 staff sergeant, 1 corporal, and 4 privates first class or privates. The organization of the aid station and the assignment of personnel to duties therein are analogous to those of similar units serving battalions of infantry.

The *litter bearer squad* consists of 4 privates first class or privates. They carry sick and wounded from the battery positions to the aid station serving with the artillery battalion.

The *battery aid squad* consists of 6 privates first class or privates, 2 being assigned to each battery as first aid men.

Battalion veterinary sections. The battalion veterinary sections consist of 2 veterinary officers, a staff sergeant, a corporal, and 12 privates first class or privates. They are supplied with equipment for the establishment of regimental veterinary dispensaries and aid stations when required. These sections may be separated to operate two battalion veterinary aid stations.

The equipment of the battalion veterinary sections is as follows:

Outfit Veterinary Field No. 1.

1 Chest, Medical Department, No. 80 (98070), Medical and Surgical (Instruments, appliances, drugs).

1 Chest, Medical Department, No. 81 (98080), Dressings, horseshoer's kit, miscellaneous equipment.

1	2	3	4	5	6	7
Unit	Specialists' ratings (class)	Headquarters section	2 battalion sections		Total	Remarks
			Medical	Veterinary		
2 Major.....		1			1	†Insert number of
3 Captain.....		(d1) 2	1	1	4	regiment.
4 First lieutenant.....		1	1	1	3	* Individually
						mounted on horse.
5 Total commissioned.....		4	* 2	* 2	8	d Dental.
6 Technical sergeant, including.....		1			1	Summary of specialists' ratings
7 Platoon leader (651).....		(1)			(1)	
8 Staff sergeant, including.....			* 2		2	
9 Section leader (652).....			(2)		(2)	Class
10 Sergeant, including.....		1		* 1	2	
11 Medical (673).....		(1)			(1)	Number
12 Veterinary (792).....				(1)	(1)	
13 Corporal, including.....			* 2	* 1	3	
14 Medical (673).....			(2)		(2)	
15 Veterinary (792).....				(1)	(1)	3d..... 1
16 Private, first class.....						4th..... 7
17 Private.....		9	(=14) 28	* 12	(33)	5th..... 16
18 Battery aid man.....			(4)		(4)	6th..... 5
19 Chauffeur (245).....	5th	(2)	(2)		(4)	Total..... 29
20 Chauffeur (245).....	6th	(1)	(2)		(3)	The serial-number symbol shown in parentheses is an inseparable part of the specialist designation. A number below 500 refers to an occupational specialist whose qualification analysis is found in section I, AR 615-26. A number above 500 refers to a military occupational specialist listed in section II, AR 615-26.
21 Clerk, record (655).....	5th	(1)			(1)	
22 Driver, pack (565).....				(2)	(2)	
23 Litter bearer.....			(10)		(10)	
24 Technician, dental (667).....	5th	(2)			(2)	
25 Technician, medical (123).....	4th	(1)	(2)		(3)	
26 Technician, medical (123).....	5th		(2)		(2)	
27 Technician, sanitary (196).....	5th	(1)			(1)	
28 Technician, surgical (225).....	3d	(1)			(1)	
29 Technician, surgical (225).....	5th		(2)		(2)	
30 Technician, surgical (225).....	6th		(2)		(2)	
31 Technician, veterinary (250).....	4th			(4)	(4)	
32 Technician, veterinary (250).....	5th			(4)	(4)	
33 Basic (521).....			(2)	(2)	(4)	
34 Total enlisted.....		11	32	14	57	
35 Aggregate.....		15	34	16	65	
36 Q Horse, pack.....				2	2	
37 Q Horse, riding.....				20	16	36
38 Total animals.....				20	18	38
39 Q Ambulance, ½-ton, cross-country.....				2		2
40 Q Truck, ½-ton, command.....		1			1	
41 Q Truck, ½-ton, pick-up.....					1	
42 Q Truck, 2½-ton, cargo, FM.....		1		2		3

Plate 3. T/O 6-11. Organization of the Regimental Medical Detachment of a Field Artillery Regiment, 75-mm Gun, Horse-drawn.

- 1 Lantern set, 3 lanterns (99547).
- 1 Desk, field company or 1 desk, field, Medical Department, No. 2 complete.
- 1 Axe with helve.
- 3 Buckets G.I. nested.
- 1 Fly for wall tent, large, complete with poles, pins, and ropes.
- 1 Fork, stable, short handle.
- 1 Marker, green cross, with staff.
- 1 Pickaxe with helve.
- 2 Picket pins, Model 1910.
- 50 foot rope, 1 inch, for field picket line.
- 1 Shovel, short handle, round point.

The equipment is transported in a 2½-ton cargo truck of headquarters section of the medical section of the battalion with which the veterinary section is operating. A one-mule, two-wheeled cart has been approved by The Surgeon General for units with animal-drawn transportation only, but it is not included in present Tables of Organization.

Equipment and transportation of the regimental medical detachment. The equipment and transportation of the regimental medical detachment of an artillery regiment, 75-mm gun, horse-drawn, is similar to that of a medical detachment with an infantry regiment

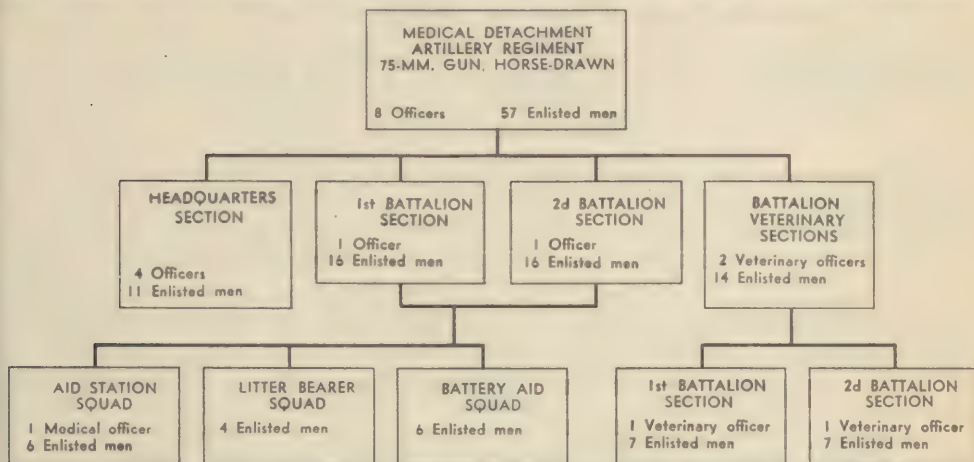


Plate 4. Suggested Functional Organization of the Regimental Medical Detachment with an Artillery Regiment, 75-mm Gun, Horse-drawn.

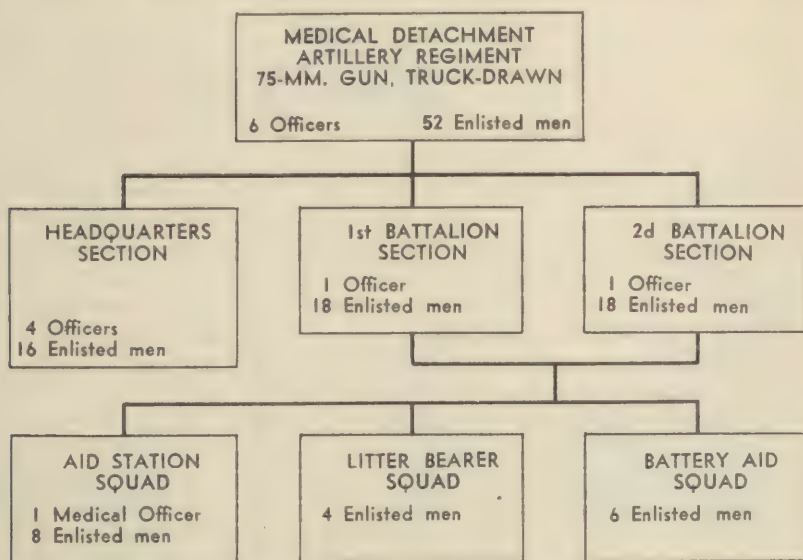


Plate 5. Suggested Functional Organization of the Regimental Medical Detachment with an Artillery Regiment, 75-mm Gun, Truck-drawn.

with respect to the individual soldier and the battalion medical sections. The veterinary equipment is listed above. Transportation is provided as follows:

36 horses, riding.

2 horses, pack

2 ambulances, ½-ton, cross-country.

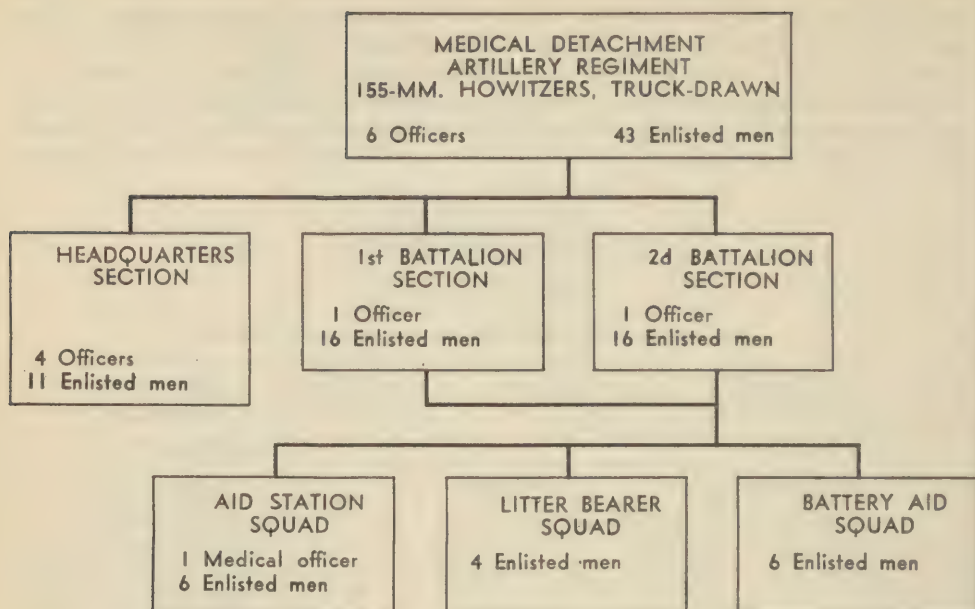


Plate 6. Suggested Functional Organization of the Regimental Medical Detachment with an Artillery Regiment, 155-mm Howitzers, Truck-drawn.

	1	2	3	4	5	6		
1	Unit	Spe- cialists' ratings (class)	Head- quarters section	2 bat- talion sections each	Total detach- ment	Remarks		
2	Major		1		1	d Dental, Summary of specialists' ratings		
3	Captain		(d)2	1	(d)4			
4	First lieutenant		d1		d1			
5	Total commissioned		4	1	6			
6	Technical sergeant		1		1	Class	Num- ber	
7	Staff sergeant			1	2			
8	Sergeant		1		1	3d..... 3 4th..... 12 5th..... 6 6th..... 6 Total..... 22		
9	Corporal			1	2			
10	Private, first class } including		9	14	(12			
11	Private				25			
12	Chauffeur (245)	5th	(2)	(1)	(4)	The serial number symbol shown in paren- theses is an inseparable part of the specialist designation. A number below 500 refers to an occupational special- ist whose qualifica- tion analysis is found in section I, AR 615-26. A number above 500 refers to a military oc- cupational specialist listed in section II, AR 615-26.		
13	Chauffeur (245)	6th		(2)	(4)			
14	Clerk, record (055)	5th	(1)		(1)			
15	Litter bearer			(5)	(10)			
16	Technician, dental (067)	5th	(2)		(2)			
17	Technician, medical (123)	4th	(1)	(1)	(3)			
18	Technician, medical (123)	5th		(1)	(2)			
19	Technician, sanitary (196)	5th	(1)		(1)			
20	Technician, surgical (225)	3d	(1)		(1)			
21	Technician, surgical (225)	5th		(1)	(2)			
22	Technician, surgical (225)	6th		(1)	(2)			
23	Basic (521)		(1)	(2)	(5)			
24	Total enlisted		11	16	43			
25	Aggregate		15	17	49			
26	Q Q Q Ambulance, ½-ton, cross country			1	2			
27	Truck, ½-ton, command		1	1				
28	Truck, ½-ton, pick-up		1		1			
29	Q Q Q Truck, 2½-ton, cargo		1	1	3			

Plate 7. T/O 6-41. Organization of the Regimental Medical Detachment with a Field Artillery Regiment, 155-mm Howitzers, Truck-drawn.

3 2½-ton cargo trucks (1 for each battalion medical section, 1 for headquarters section).

1 truck, ½-ton, command.

1 truck, ½-ton, pick-up.

The Regimental Medical Detachment with the Artillery Regiment, 75-mm Gun, Truck-drawn. The regimental medical detachment with the artillery regiment, 75-mm gun, truck-drawn, is identical in function, organization, and equipment with that of the 75-mm gun, horse-drawn regiments, with the exception that it has no veterinary personnel nor horses. The total strength is 6 officers and 52 enlisted men. (See Plate 5.)

The Regimental Medical Detachment with the Artillery Regiment, 155-mm Howitzers, Truck-drawn. The medical detachment with an artillery regiment, 155-mm howitzers, truck-drawn, is divided into a headquarters section and three battalion medical sections. (See Plate 6.)

Headquarters section. The headquarters section consists of the regimental surgeon, the assistant regimental surgeon, 2 dental officers, a technical sergeant, a sergeant, and 9 privates first class or privates. The assignments and duties of the commissioned and enlisted personnel are analogous to those of like personnel with an infantry regiment, war strength.

Battalion medical section. Each battalion medical section consists of a battalion surgeon, a staff sergeant, a corporal, and eleven privates first class or privates. The assignments and duties of the battalion surgeon and the enlisted personnel are analogous to those of like personnel with an infantry battalion, war strength.

The section is divided into:

An *aid station squad* which consists of a medical officer, a staff sergeant, a corporal, and 3 privates first class or privates.

A *litter bearer squad* of 4 privates first class or privates.

A *battery aid squad* of 4 privates first class or privates, two of whom are assigned to duty as first aid men with each battery.

Equipment and transportation. The equipment and transportation of the medical detachment is shown in the Table of Organization 6-41, Plate 7.

The Regimental Medical Detachment with the Engineer Regiment, Combat. The medical detachment with the engineer regiment, combat consists of headquarters regimental medical detachment and 2 battalion medical sections. Its personnel consists of 3 medical officers, 1 dental officer, and 26 enlisted men. (See T/O 5-11.)

Headquarters section. The headquarters section consists of 1 medical officer, 1 dental officer, 1 staff sergeant, and 5 privates first class or privates. The duties of the commissioned and enlisted personnel are analogous to those of like personnel in the infantry regiment.

Battalion medical section. Each battalion section consists of 1 medical officer, 1 sergeant, and 9 privates first class or privates. On the march and in combat one company aid man is attached to each company. The remainder of the personnel is used for the operation of the aid station for the battalion. Four of the enlisted men may be used as litter bearers when necessary. Except when the engineer regiment is called upon to perform combat missions, it is normally located several miles from the front and may be dispersed throughout the divisional area. In such situations emergency treatment and medical attention may be obtained for engineer personnel through contact with medical units in their vicinity.

Equipment and transportation. The equipment of the unit and individual soldier is identical with that of the medical detachment of the infantry regiment. The transportation consists of:

1 car, light, 5-passenger, sedan (headquarters section), 3 trucks, 1½-ton truck, cargo (1 for headquarters section and 1 for each of the battalion medical sections).

The Attached Medical Personnel with the Quartermaster Regiment. The attached medical personnel for the quartermaster regiment consists of 3 medical officers, 1 dental officer, 1 technical sergeant, 3 sergeants, and 13 privates first class or privates.

The organization of the detachment is dependent upon the distribution of the quartermaster regiment and is a responsibility of the unit surgeon.

The transportation consists of:

- 1 motorcycle, with sidecar.
- 1 truck, 1½-ton, cargo. (For transportation of equipment).

The Attached Medical Personnel with the Ammunition Train. In the infantry division, the medical personnel of the ammunition train consists of 1 medical officer, 1 staff sergeant, 1 sergeant, and 7 privates first class or privates. The transportation consists of:

- 1 ambulance, field.
- 2 trucks, 1½-ton, cargo.
- 3 trucks, reconnaissance.

The Attached Medical Personnel with Division Special Troops. Special troops of the infantry division consists of a headquarters company, a service company, ordnance company, light tank company, signal company, and military police company. On the march and in combat these units are well distributed throughout the division area or column to enable them to carry out their normal functions. In combat a considerable number of special troops are assigned to duty at the division command post and at the rear echelon of division headquarters. Others will be assigned to duty with the field artillery, ammunition train, the quartermaster train, or distributed elsewhere in the division zone of action as their duties may require. The tank company is frequently attached to infantry organizations in attack situations.

The medical detachment with Special Troops consists of 2 medical officers, 1 dental officer, 1 staff sergeant, 1 sergeant, 1 corporal, and 11 privates, first class or privates. The transportation consists of one motorcycle with side car and one 1½-ton cargo truck for transportation of medical equipment equivalent to that of the battalion medical section of the infantry battalion.

Company aid men are assigned to each company on the march, or when for any reason large details from these organizations are needed for duty close to the front. It may be necessary to establish a *small aid station* in the vicinity of the division command post or near the rear echelon headquarters during periods of combat. *Litter bearers* will not usually be required with special troops. Sick and wounded should be evacuated directly from aid station by units of the division medical regiment.

DETACHMENTS WITH UNITS OF THE INFANTRY DIVISION, "TRIANGULAR"

During the past few years there has been under development for the use of the Regular Army a small division, now designated as the "Triangular" Division. The strength

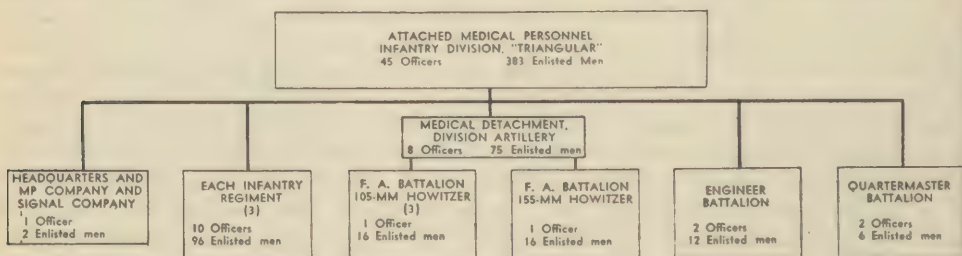


Plate 8. Attached Medical Personnel of the Infantry Division, Triangular.

of the attached medical personnel allotted to the various units of this division is shown in Plate 8. The regimental medical detachments of infantry regiments are identical in organization, equipment, transportation, and function as those of the infantry division, "Square." (See Plate 8.) The medical detachment of the division artillery

includes a headquarters medical section of 4 officers and 11 enlisted men, and four battalion medical sections of 1 officer and 16 enlisted men each. (See Plate 9.) The division artillery medical detachment thereby operates similarly to the regimental medical detachment with artillery in the square division, except that it has four battalion sections. The transportation of the detachment and its distribution are shown in Plate 9.

The medical personnel of the engineer battalion, the quartermaster battalion, and the headquarters and military police company and signal company operate as independent battalion medical sections (detachments). The evacuation of casualties from the medical installations operated by these medical detachments of the triangular division is related in Chapter II in the discussion of the medical battalion.

The principles of operation, functional organization, and management of the medical detachments of this division are the same as for the square division. Whenever the exigency exists demanding additional medical personnel, such requirements for medical personnel will be met by medical units of the corps and the field army.

	1	2	3	4	5	6	
	Unit	Specialists' ratings (class)	Headquarters section	4 battalion sections each	Total detachment	Remarks	
1	Major.....		1		1	4 Dental.	
2	Captain.....		(4 1) 2	1	(4 1) 6		
3	First lieutenant.....		1		1		
4							
5	Total commissioned.....		4	1	(4 2) 8	Summary of specialists' ratings	
6	Technical sergeant.....		1		1	Class	Number
7	Staff sergeant.....			1	4		
8	Sergeant.....		1		1	3d.....	1
9	Corporal.....			1	4		
10	Private, first class.....		9	14	19		
11	Private.....				46		
12	Chauffeur (245).....	5th.....	(2)	(1)	(6)		
13	Chauffeur (245).....	6th.....		(2)	(8)	4th.....	5
14	Clerk, record (055).....	5th.....	(1)		(1)	5th.....	18
15	Litter bearer.....			(5)	(20)	6th.....	12
16	Technician, dental (067).....	5th.....	(2)		(2)	Total.....	
17	Technician, medical (123).....	4th.....	(1)	(1)	(5)		
18	Technician, medical (123).....	5th.....		(1)	(4)	The serial number symbol shown in parentheses is an inseparable part of the specialist designation. A number below 500 refers to an occupational specialist whose qualification analysis is found in section I, AR 615-20. A number above 500 refers to a military occupational specialist listed in section II, AR 615-20.	
19	Technician, sanitary (196).....	5th.....	(1)		(1)		
20	Technician, surgical (225).....	3d.....	(1)		(1)		
21	Technician, surgical (225).....	5th.....		(1)	(4)		
22	Technician, surgical (225).....	6th.....		(1)	(4)		
23	Basic (521).....		(1)	(2)	(9)		
24	Total enlisted.....		11	16	75		
25	Aggregate.....		15	17	83		
26	Q Ambulance, ½-ton, cross country.....			1	4		
27	Q Truck, ½-ton, command.....		1	1	5		
28	Q Truck, ½-ton, pick-up.....				1		
29	Q Truck, 2½-ton, cargo, PM.....		1	1	5		

Plate 9. T/O 6-80. Medical Detachment, Division Artillery, Infantry Division, Triangular.

The unit surgeon and unit commander will use the medical personnel to the best advantage for the mission or missions to be performed by the command. Full advantage will be taken to use unit transportation for the evacuation of casualties, and to avoid litter carry, when the situation permits. The ultimate practical solution of functional organization of the medical detachment therefore falls upon the decision of the unit surgeon to fit the plan of his commander. Consideration should be given to furnishing adequate medical service during operation of standing operating procedures.

DETACHMENTS WITH UNITS OF THE CAVALRY DIVISION

The Regimental Medical Detachment with the Cavalry Regiment. The medical detachment with the cavalry regiment is divided into a headquarters section, three squadron medical sections, and a veterinary section. (See Plate 10.)

Headquarters section. The headquarters section consists of the regimental surgeon, a dental officer, a technical sergeant, and 14 privates first class or privates.

Squadron medical section. Each squadron section consists of the squadron surgeon, a sergeant, and 11 privates first class or privates. For functional purposes the squadron section may be divided into:

An aid station squad.

A litter bearer squad.

A troop aid squad.

The duties of the personnel of a squadron section with cavalry are analogous to those of similar units serving battalions of infantry.

Veterinary section. The veterinary sections consist of 3 veterinary officers, a staff sergeant, 2 sergeants, and 11 privates first class or privates. For functional purposes this section may be divided into a transportation section of 2 enlisted men, and 3 squadron sections of 1 officer and 4 enlisted men each.

Equipment and transportation. The equipment and transportation of the regimental medical detachment with cavalry is analogous to that of the medical detachment of an infantry regiment except in quantity. Pack animals are used to carry the equipment of the squadron sections. One motor ambulance, 1 motorcycle with sidecar, and one 1½-ton truck are assigned to the headquarters section. A 1½-ton truck is also assigned to the regimental veterinary detachment. The transportation for the regimental medical detachment with the cavalry is as follows:

65 horses, riding.

6 horses, pack.

1 ambulance, field.

1 motorcycle, with side car.

2 1½-ton trucks, cargo.

The Medical Detachment With Division Artillery, Cavalry Division. The medical detachment with the division artillery, cavalry division, is divided into a headquarters section, 2 horse battalion medical sections, 2 horse battalion veterinary sections, and 1 truck-drawn battalion medical section. (See Plate 11.)

Headquarters section. The headquarters section consists of the regimental surgeon, the assistant regimental surgeon, 2 dental officers, 1 technical sergeant, 1 sergeant, and 8 privates first class or privates. The assignments and duties of commissioned and enlisted personnel are analogous to the assignments and duties of like personnel in the headquarters section with an infantry regiment.

Horse battalion medical section. Each battalion medical section consists of a battalion surgeon, a staff sergeant, a corporal and 14 privates first class or privates. It is divided for functional purposes into:

An aid station squad.

A litter bearer squad.

A battery aid squad.

The duties of the battalion surgeon, aid station squad, litter bearer squad and battery aid squad are analogous to the duties performed by the battalion surgeon and such squads of the battalions of infantry. The battalion medical section, however, must retain a higher state of mobility in order to keep up with the mounted troops. Transportation facilities must be kept readily available.

Horse battalion veterinary sections. The veterinary sections consist of 2 veterinary officers, 1 sergeant, a corporal, and 12 privates first class or privates. The duties of the commissioned and enlisted personnel are analogous to those of like personnel in the veterinary sections of the artillery regiment, 75-mm gun, horse-drawn. It is, however, a more mobile unit and transportation must be kept readily available.

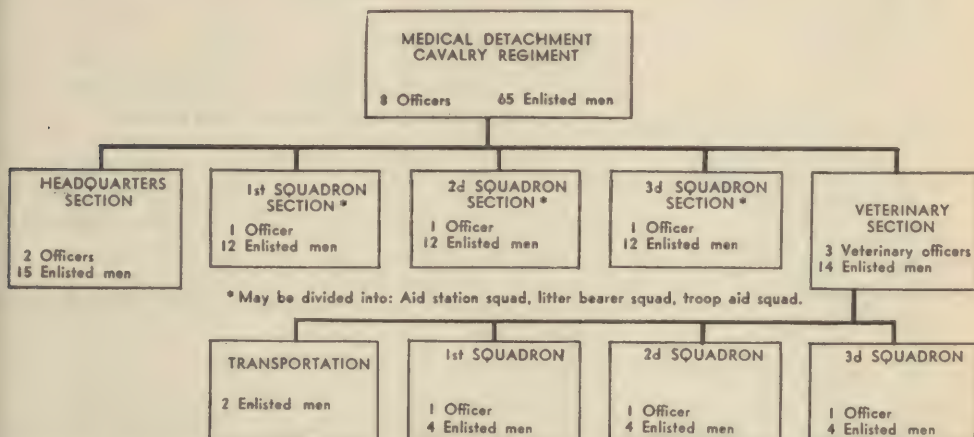


Plate 10. Suggested Functional Organization of the Regimental Medical Detachment with the Cavalry Regiment.

Transportation of the medical detachment, division artillery. The transportation of the medical detachment of the division artillery, cavalry division, consists of:

- 36 horses, riding.
- 2 horses, pack.
- 3 ambulances, $\frac{1}{2}$ -ton, cross-country.
- 4 $2\frac{1}{2}$ -ton cargo trucks, PM.
- 2 $\frac{1}{2}$ -ton command trucks.

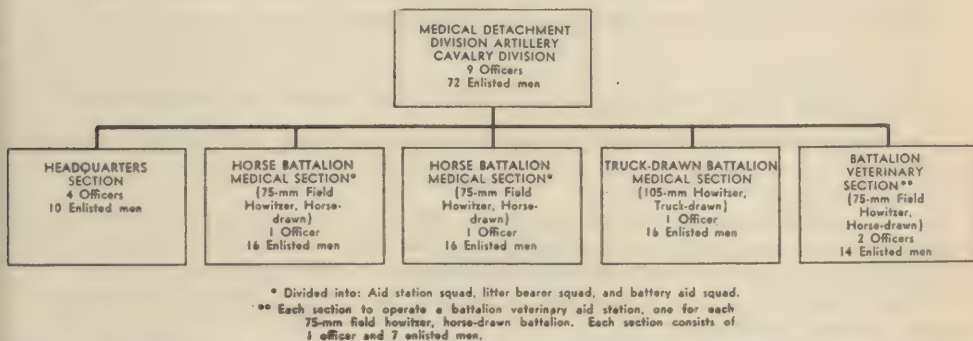


Plate 11. Suggested Functional Organization of the Medical Detachment of the Division Artillery, Cavalry Division.

Medical Detachments of the Engineer Squadron, Quartermaster Squadron, and Special Troops of the Cavalry Division. The attached medical personnel of these units is organized and operates similarly to like units of the Infantry division, "Square."

	1	2	3	4	5	6	7	8
1	Unit	Specialists' ratings (class)	Headquarters section	2 horse battalion sections		1 truck-drawn battalion section	Total	Remarks
				Medical	Veterinary			
2	Major.....		1				1	
3	Captain.....		(d1) 2	1	1	1	5	
4	First lieutenant.....		1	1	1		3	
5	Total commissioned.....		4	* 2	* 2	1	9	* Mounted on horse. * Dental.
6	Technical sergeant, including.....		1				1	
7	Platoon leader (651).....		(1)				(1)	
8	Staff sergeant, including.....			* 2		1	3	Summary of specialists' ratings
9	Section leader (652).....			(2)		(1)	(3)	
10	Sergeant, including.....		1		* 1		2	
11	Medical (673).....		(1)				(1)	
12	Veterinary (792).....				(1)		(1)	
13	Corporal, including.....			* 2	* 1	1	(3)	
14	Medical (673).....			(2)		(1)	(1)	
15	Veterinary (792).....				(1)		(1)	
16	Private, first class.....		8	(14) 28	* 12	14	{	3d..... 1
17	Private.....							4th..... 8
18	Battery aid man.....			(4)			(4)	5th..... 19
19	Chauffeur (245).....	5th	(2)	(2)		(1)	(5)	6th..... 9
20	Chauffeur (245).....	6th		(2)		(2)	(4)	
21	Clerk, record (355).....	5th	(1)				(1)	
22	Driver, pack (565).....	6th			(2)		(2)	
23	Litter bearer.....			(10)		(5)	(15)	
24	Technician, dental (067).....	5th	(2)			(1)	(2)	
25	Technician, medical (123).....	4th	(1)	(2)		(1)	(4)	
26	Technician, medical (123).....	5th		(2)		(1)	(3)	
27	Technician, sanitary (196).....	5th	(1)				(1)	
28	Technician, surgical (225).....	3d	(1)				(1)	
29	Technician, surgical (225).....	5th		(2)		(1)	(3)	
30	Technician, surgical (225).....	6th		(2)		(1)	(3)	
31	Technician, veterinary (250).....	4th			(4)		(4)	
32	Technician, veterinary (250).....	5th			(4)		(4)	
33	Basic (521).....			(2)	(2)	(2)	(6)	
34	Total enlisted.....		10	32	14	16	72	
35	Aggregate.....		14	34	16	17	81	
36	Q Horse, pack.....				2		2	
37	Q Horse, riding.....			20	16		36	
38	Total animals.....			20	18		38	
39	Q Ambulance, ½-ton, cross country.....			2		1	3	
40	Q Truck, ½-ton, command.....		1			1	2	
41	Q Truck, 2½-ton, cargo, PM.....		1	2		1	4	

Plate 12. T/O 6-110. Organization of the Medical Detachment, Division Artillery, Cavalry Division.

INTERIOR ECONOMY OF THE ATTACHED MEDICAL PERSONNEL

The interior economy including *pay, supply, reports, and records* of a medical detachment conforms to that of similar organizations of other services of the army and is governed by the same regulations.

Messing. When troops are not on the march, and when practicable, the medical detachment may draw mess equipment and conduct its own mess. Usually, the regimental medical detachment messes with the headquarters company of the regiment it serves.

When troops are on the march or in combat the regimental medical detachment usually messes as follows:

Headquarters section of the regimental medical detachment with the headquarters company or battery of the regiment.

Battalion or squadron medical and veterinary sections (less company, battery, or troop aid men) with the company, battery, or troop as assigned by the battalion or squadron commander.

Company, battery, or troop aid men with the company, battery, or troop which they are serving.

DUTIES OF COMMISSIONED PERSONNEL

Regimental Surgeon (Detachment Commander). The senior medical officer present commands the detachment and is the surgeon of the regiment. He serves in both an advisory and administrative capacity.

As a member of the staff of the regimental commander he advises that officer on medical and sanitary matters, all advice given or recommendations made to be in accord with the policies of higher medical authority.

He supervises all training of the detachment and instructs the entire personnel of the regiment in personal hygiene, field sanitation, and first aid.

He provides care and treatment for the sick and wounded.

He makes the sanitary inspections, supervising the sanitary procedures and precautions necessary to preserve the health of the command.

He makes timely requisitions for all necessary equipment, including medical, dental, and veterinary supplies.

He organizes the medical detachment and plans its work so as to insure the accomplishment of its mission with the least possible disturbance to the arm or service which it serves. Such organization of the attached medical troops and such plans as he may make for their tactical employment are as simple as is consistent with the accomplishment of their mission.

He keeps such records and renders such reports and returns as may be required.

Assistant Regimental Surgeon. The assistant regimental surgeon is an officer of the medical corps, usually of the rank of captain or first lieutenant. In general, his duties are such as may be assigned to him from time to time by the surgeon. He acts for and in the name of the surgeon during that officer's absence from the command. He may be detailed to supervise the preparation of reports and returns, the preparation of requisitions for supplies, and the issue of such supplies to sections of the medical detachment. He may also be placed in charge of the regimental dispensary and of the regimental aid station when it is established. Under the supervision of the surgeon, he may be detailed to hold sick call and conduct the training of the personnel of the headquarters section of the regimental medical detachment.

Battalion or Squadron Surgeon. The senior medical officer, usually a captain, assigned to duty with any battalion or squadron of the regiment is the battalion or squadron surgeon. In general, his duties within the battalion or squadron are analogous to the duties of the regimental surgeon within the regiment.

Assistant Battalion or Squadron Surgeon. The assistant battalion or squadron surgeon is an officer of the medical corps assigned to duty with the battalion or squadron by the regimental surgeon. In general, the assistant battalion surgeon's duties in the battalion or squadron are analogous to the duties of the assistant regimental surgeon of the regiment. During combat he treats or supervises the treatment of casualties within the battalion aid station. Because the battalion surgeon's duties require him to leave the station occasionally, it is more practical for the assistant battalion surgeon to treat the seriously wounded.

Dental Officers. Dental officers of the detachment are subordinate to the senior medical officer of the detachment to which attached and are under his immediate command. In the interior organization of the detachment, dental officers are usually included in the headquarters of the regimental medical detachment and assigned to duty with separate battalions or squadrons of the regiment by the regimental surgeon whenever he considers such assignment necessary. Under the direction and supervision of the regimental surgeon, they are responsible for the dental care of the command. This includes the instruction of the entire personnel of the regiment in oral hygiene, the making of oral inspections to determine whether or not the command is practicing oral hygiene, the making of dental surveys to determine the amount and character of dental work to be done, and the accomplishment of this work in its order of importance to the command and to the individual. They establish and operate the dental service of dispensaries and during combat assist the regimental, battalion, or squadron surgeons,

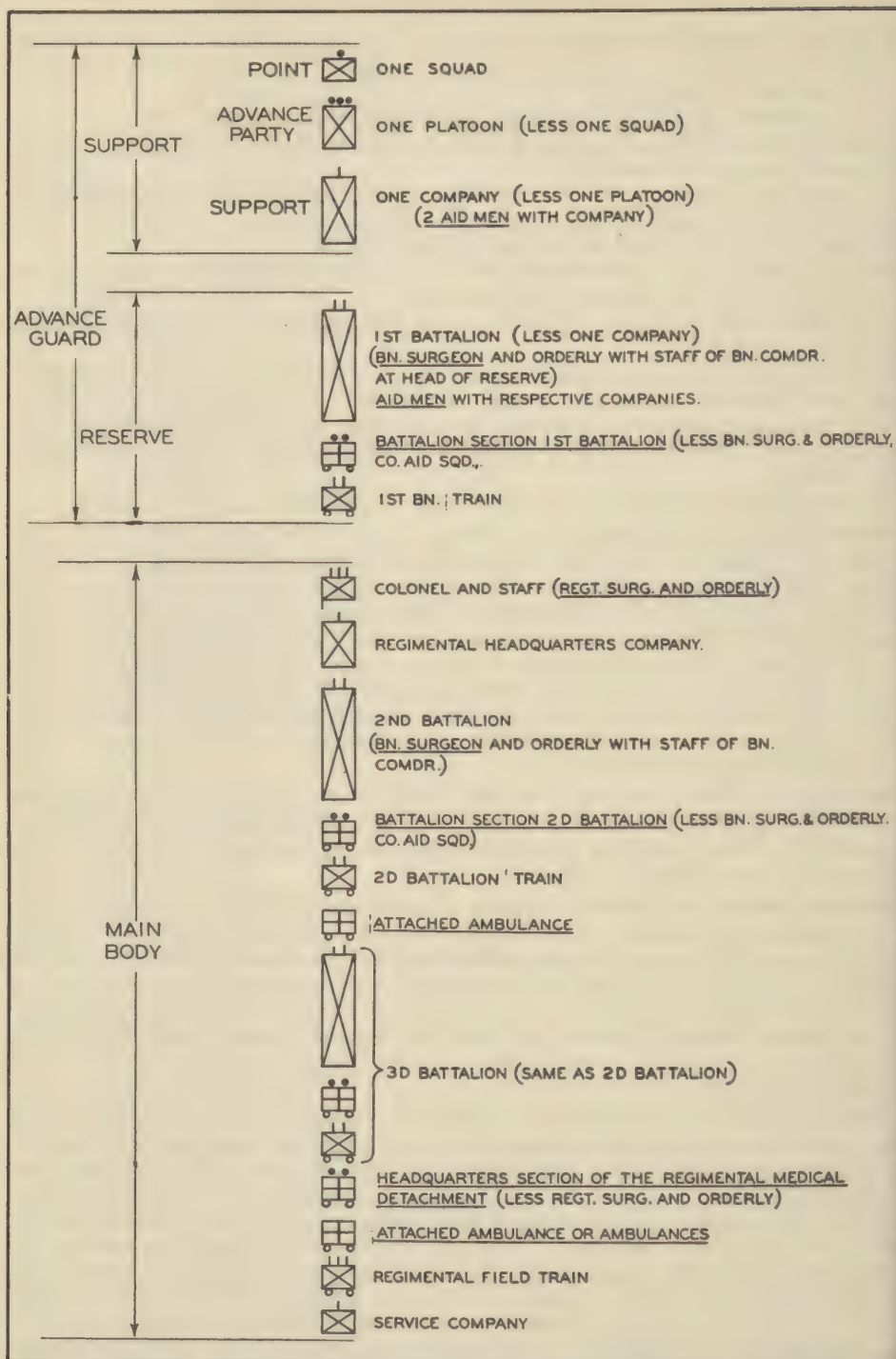


Plate 13. Distribution of Regimental Medical Detachment on the March.

as the situation requires. They are usually retained within the headquarters section of the regimental medical detachment, but in the absence of a medical officer they may serve as regimental, battalion, or squadron surgeons. They are responsible for the diagnosis, care, and treatment of dental injuries received in combat. They keep dental records and render dental reports and returns as required.

Veterinary Officers. Veterinary officers are included in the regimental medical detachment of units supplied with animals. They are subordinate to the senior medical officer of the command and are under his immediate supervision and control. In general, their duties are as follows:

Full responsibility for the veterinary service of the entire command: This includes the initiation of protective measures for the prevention of communicable diseases, and the early detection, care, and treatment of such cases; the adoption of all necessary suppressive measures to limit the extension and duration of such diseases; the reduction of animal losses and inefficiency through the prompt discovery of the sick and wounded animals; the collection, isolation, care, and treatment of the sick and wounded animals until such time as they can be evacuated from the command or otherwise disposed of; the establishment and maintenance of a veterinary sanitary service within the command for the maintenance of animals in a suitable environment as regards shelter, handling, restraint, foods and feeding, grooming, work, exercise, and shoeing.

The establishment and operation of veterinary aid stations, and the collecting, care, and treatment of the sick and wounded animals of the regiment at such stations.

The inspection of meats, meat foods, and dairy products purchased or issued to troops.

The special training of veterinary personnel, and the instruction of personnel of the entire command concerning veterinary matters.

The keeping of records and the preparation and rendition of such reports and returns as are required.

EMPLOYMENT OF THE ATTACHED MEDICAL PERSONNEL WITH INFANTRY

In Garrison

The principal functions of the regimental medical detachment in garrison are: training, sanitary inspections, operation of dispensaries and station hospitals.

Regiments ordered from the field to garrison will ordinarily be accompanied by their medical detachments. In large garrisons, personnel from the regimental medical detachments is assigned to duty at the station hospital in such numbers as are necessary to meet the hospitalization requirements.

Sanitation of Stations and Permanent Camps. The duties of the medical detachment in connection with sanitation are inspectorial and advisory. Sanitary procedure in a permanent station or camp is, in general, such as will modify and adapt the sanitary environment to the needs of the troops, rather than the temporary or expedient measures which may be used to protect the health of the command while in the field.

On the March

The medical service on the march concerns itself with the care and evacuation of march casualties.

Duties of Medical Officers. Prior to the march the commanding officer of the medical detachment obtains from the regimental commander his instructions as to the day's march and communicates to his subordinates such instructions as he may deem necessary for their information and guidance. He inspects the detachment as to its preparedness for participation in the march, giving particular attention to the condition of men, animals (if used), transportation, and equipment.

During the march, medical officers dispose of march casualties and conduct the march of troops under their direct command.

Disposition of the Regimental Medical Detachment for the March. The medical detachment is disposed in the column as directed by the regimental commander. The regimental surgeon, accompanied by his orderly, usually marches with that part of the staff which accompanies the regimental commander. The assistant regimental surgeon marches with the headquarters section, the position of the latter being determined by the orders issued for the march. Dental officers march with the headquarters section when not assigned to battalion medical sections. The veterinary section of the regimental medical detachment (organizations having animals) marches with the regimental train.

Battalion and squadron surgeons, accompanied by their orderlies, march with the battalion or squadron commander. Assistant battalion or squadron surgeons march at the rear of the battalion or squadron and at the head of their respective battalion medical sections. When there is but one medical officer with the battalion or squadron he marches at the rear of the battalion or squadron column, going forward when necessary for the purpose of making contact with and gaining information from the commanding officer. Company, battery, and troop aid men march with the battalion section, except that when contact with the enemy is expected they march with the companies to which assigned. The remaining personnel of the section marches at the rear of the battalion or squadron column.

Medical trucks carrying the field medical sets of battalion medical sections while so marching are a constituent part of the battalion train; in like manner, the medical trucks of the headquarters section of the medical detachment are a constituent part of the train of the regimental headquarters company. When operations are imminent or march conditions cease, these trucks are released to the battalion or regimental surgeon (standing operating procedures).

Ambulance Service. Ambulances accompanying marching troops for the collection and evacuation of march casualties will ordinarily be detailed from ambulance elements of divisional medical regiments or battalions. Ambulances and personnel so detailed are under the immediate control of the regimental surgeon for the duration of the march. When march conditions cease ambulances revert to their normal command status and return to their organizations. If but one ambulance is with the regiment, it follows the headquarters section of the regimental medical detachment at the rear of the column. If additional ambulances accompany the column, they may be marched with the battalion medical sections. Ambulances organically assigned to cavalry, field artillery, or other units are similarly disposed of during the march but remain with their organizations.

March Casualties. Sick or disabled soldiers are ordinarily reported to the commanding officer of their unit by squad leaders. The commanding officer usually directs the soldier to see the medical officer at the next halt or issues a pass for the soldier to drop out of the column and await the arrival of a medical officer. The medical officer who examines the soldier returns this pass to the soldier's company commander, showing thereon the disposition which he has made of the case.

The medical officer disposes of the soldier in accordance with the conditions found after hasty examination. He may relieve the soldier of his pack and require him to continue the march; he may put him in an ambulance for disposition at the end of the march, or on any other piece of transportation if there is no ambulance attached to the organization; or he may require him to march at the tail of the column, where he can be kept under observation.

In case the march order provides for march collecting posts, casualties are continued with the column until the next station is reached. If an evacuation point only is designated, casualties unable to continue with the column are left by the roadside or delivered to ambulances in the rear for evacuation.

All casualties separated from their organization are plainly tagged by a medical officer. All arms and personal equipment of sick or disabled foot soldiers remain with them; the mount, saddle equipment, and arms of mounted soldiers are returned to their organizations.

Rapidly moving mounted commands, except when provided with ambulances, rarely have transportation for the sick and disabled. March casualties unable to continue with

the column may be directed to follow the command at a walk, or they may be sent back toward the main body. It may be necessary to leave them with inhabitants or under shelter, to be picked up and evacuated to the rear by following troops. In all cases it must be left to the judgment of medical officers whether or not casualties should be accompanied by personnel of the medical detachment.

A record of the disposition made of sick and disabled soldiers on the march is kept by the medical officer.



Plate 14. Battalion Dispensary Established in Camp.

Regimental Medical Detachment with Security Detachments. Combat units forming advance guards, rear guards, and other security detachments are normally accompanied by their attached medical troops. Plate 13 illustrates the manner in which the personnel of the regimental medical detachment may be distributed in and among the units of an infantry regiment marching with one battalion as an advance guard.

In Camp

The regimental medical detachment camps or bivouacs in accordance with march dispositions.

Battalion, squadron, and regimental dispensaries are established upon arrival in camp. Only such equipment is utilized as is necessary to permit proper functioning. Sick call is held daily on the establishment of the camp, while troops are in the camp, and just prior to the breaking of camp.

Except when acting alone, the regimental medical detachment has no responsibilities as to evacuation of casualties from the regiment. March casualties unable to continue with the column are disposed of at night halts by delivery to ambulance elements or by transfer to the rear on returning, empty supply transportation. Ambulances and dispensaries exchange litters, blankets, and other medical property which accompanies patients.

In Combat (General)

Tactical Employment of Medical Detachments of Infantry Units. In general, the principles herein set forth govern the tactical employment of all medical personnel attached to organizations of combat troops, although they are discussed in respect to service with infantry units.

The tactics of the combat unit is the determining factor in the tactics to be employed by attached medical troops. All operations of the regimental medical detachments in the field have as their mission the rendering of support and assistance to the combat troops. They include the following:

Finding, tagging, and aiding the disabled, and separating them from the able; establishment of aid stations; the collection and treatment of casualties; prevention of unnecessary movement to the rear on account of sickness or injury; preservation of morale by early medi-

cal attention and removal of the wounded; examination of the dead and sanitary supervision of their disposal; and preparation of records of dead and wounded.

In order to accomplish the above, the surgeon must be informed of his mission, the military situation, the plan and time of action, zones of action, scheme of maneuver, and the terrain. This knowledge is obtained from his unit commander, through personal reconnaissance, and by the use of available maps. He can thereby determine the area of expected "casualty density."

Reconnaissance. Reconnaissance on the part of medical officers is necessary for the efficient execution of the medical service in the field. All medical officers should endeavor to make a reconnaissance of the area occupied or to be occupied by their organizations, and to gather such information concerning the territory to the immediate front and rear of their areas as will enable them to prepare hasty plans for the collection, treatment, and evacuation of the sick and wounded in case of a general advance or retirement. Regimental surgeons who find it impossible to complete such a reconnaissance because of insufficient time or of limitations imposed by the enemy should, after battalion medical officers have established their aid stations, make a reconnaissance and suggest to battalion commanders the desirability of any changes. The reconnaissance as made by medical officers is topographical in character and generally is conducted for the purpose of obtaining the following information:

<i>What to look for</i>		<i>Why</i>
General character of country		Orientation.
High ground		For observation points, to avoid, or to take shelter behind.
The road net		For routes of evacuation to rear.
Ravines and stream beds, trails, etc.		For determination of the natural lines of drift of wounded.
Cover	Brush	For shelter from observation and fire; for location of aid stations.
	Woods	
	Ravines	
	Stream lines	

Classification of Casualties. Casualties may be classified as follows:

<i>First classification</i>	<i>Second classification</i>	<i>Third classification</i>
(a) Communicable:		
1. Sick		
(b) Noncommunicable:	Slight	Walking
2. Gassed	Medium	Transportable (lying, sitting)
3. Wounded	Severe	Nontransportable
4. Killed		

The approximate proportion of killed and wounded and of walking and transportable wounded, in open and in stabilized military operations, is indicated below:

Type of Casualty	Open warfare Percent	Stabilized warfare Percent
Dead	15	20
Wounded	85	80
Able to walk to aid station	(45)	(40)
Must be carried to aid station	(40)	(40)

Estimation of Battle Casualties. In order that proper plans may be made for the collection, treatment, evacuation, and replacement of casualties, an estimate of battle casualties and the determination of expected areas of "casualty density" are necessary. In addition to battle casualties, a front line infantry regiment will have, on any battle day, approximately six-tenths (0.6) of 1 per cent sick and non-battle injured.

Battle casualties will average 12 to 15 per cent per day of severe fighting for an infantry regiment. This figure is approximate; in very severe fighting it has run as high as 35 per cent.

In estimating probable battle casualties, the following facts must be kept in mind:

Battle casualties are not ordinarily equally distributed along the front.

The percentage of casualties in certain battalions and companies will be greater than in the regiment as a whole.

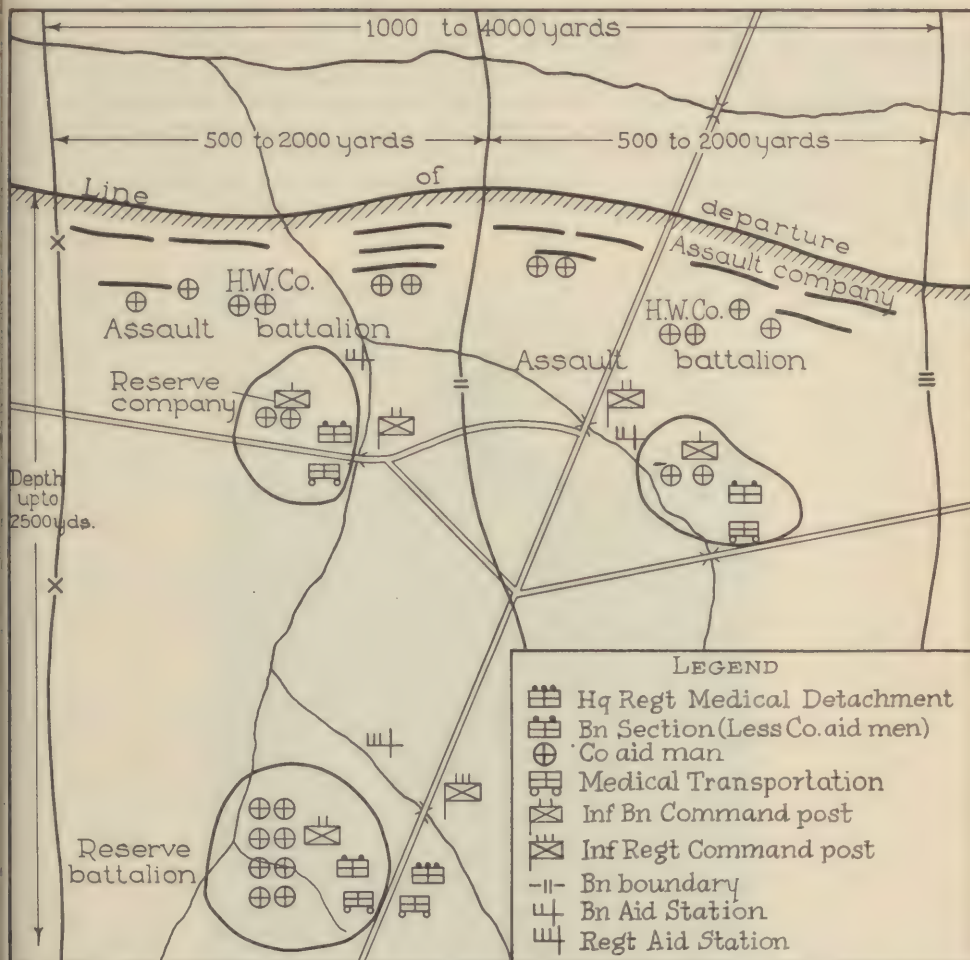


Plate 15. Deployment of an Infantry Regiment for Attack, Showing Frontages, Depth, and Positions of the Regimental Medical Detachment.

Attacking troops usually have more casualties than defending troops.

In the attack the greatest number of casualties will occur in units having the more difficult missions.

In the defense the greatest number of casualties will occur in units holding important points.

Heavy casualties usually occur at stream crossings, road crossings, road and railway junctions, and generally in locations under enemy observation.

Orders. The field orders issued by the regimental and battalion commanders specify the time of attack, the frontages, the line of departure, the lateral boundaries, and the scheme of maneuver of the unit. In this order the initial location of the aid station is designated by the commander, usually after recommendation and conference with the surgeon.

Surgeons should make sure that they receive a copy of the field order, either orally or in writing, for without this necessary information they cannot intelligently serve their

units. The surgeon issues orders to his subordinates, ordinarily in the form of messages or oral instructions. The orders when so issued are usually fragmentary.

Area of Operation. The area of operation of the regimental medical detachment as well as the battalion medical section is the same as that of the respective combat unit served. A diagram indicating the usual frontages and depths is shown in Plate 15.

Functions of the Company Aid Squad. Two men from the company aid squad of the battalion medical section are assigned to each lettered company of the infantry battalion. These company aid men follow their respective companies in battle, giving such first aid treatment as is possible, tagging sick, wounded, and dead; directing the walking wounded to the position of the aid station; and placing casualties unable to walk in sheltered positions where they can be picked up by litter squads or evacuated later by ambulances. Company aid men send information to the battalion surgeons by messages carried by the litter bearers or walking wounded.



Plate 16. Company Aid Man.

Emergency Medical Tag. The emergency medical tag is a waterproof linen tag upon which is recorded a diagnosis of the patient's disease or injury, the treatment given or required, and other essential data. A copper wire is attached to one end, permitting the tag to be fastened readily to the patient's clothing, usually over the breast. (See Plate 17.)

Use. As a sick and wounded record the Emergency Medical Tag (W.D., M.D. Form No. 52b) is prescribed for use in a theater of operations in time of war, and in time of peace whenever troops move by rail or take the field to engage in practice marches or maneuvers. During or after an engagement it will be attached to all sick, wounded, and dead. In referring to this tag the use of the abbreviation EMT is authorized.

Purpose. For the sick and wounded the primary purpose of the emergency medical tag is to inform the medical officers under whose observation the patient successively comes, of the character of the disability and the treatment previously given at the several points of relief on the field or on the way to the rear.

LAST NAME		FIRST NAME		INITIAL	
NEWTON		JOSEPH		R.	
ARMY SERIAL NUMBER	RANK	COMPANY	REGIMENT AND ARM OR SERVICE		
7864932	Priv.	A	16 th Inf.		
DIVISION	CORPS	ARMY	AGE	RACE	NATIVITY
37	V	FIRST	22	W	MONT
STATION WHERE TAGGED.			DATE	HOUR	
Aid station, 1st BN, 16 th INF.			Jan 16/40	10 A.M.	
DIAGNOSIS: IF INJURY, STATE HOW, WHEN, WHERE INCURRED					
WIA GSW Pen forearm right 5 Shell fragment					
LINE OF DUTY <i>yes</i>					
TREATMENT:					
Iodine, first aid dressing					
ANTITETANIC SERUM: DOSE <i>1500 units</i> TIME <i>10:15 a.m.</i>					
MORPHINE: DOSE <i>None</i> TIME					
DISPOSITION:			DATE	HOUR	
To coll. Sta					
SIGNATURE, WITH RANK AND ORGANIZATION:					
Harry E. Smith, 1st Lt., M.C., 16 th Inf.					
Form 52b—MEDICAL DEPARTMENT, U. S. A. (Revised January 31, 1940) GPO 15434					

SUPPLEMENTAL RECORD	
1-16-41	
10:48 A.M. - Redressed Coll Sta. 16 C.T.	
To CLR STATION	
D.A.W.	

Plate 17. The Emergency Medical Tag, Form No. 52b, M.D. (Front and Back).

For the dead the purpose of the emergency medical tag is: to prevent a loss of time by other medical personnel in examining the body; to furnish as much information as is practicable regarding the details of the death.

Preparation. The emergency medical tag will be made out by the first member of the medical department who treats the patient previous to his admission to a hospital, or who finds or examines the remains. The identification tag should be utilized to obtain or verify the necessary information concerning his name, rank, and organization.

The tissue paper protecting the carbon sheet will be torn out before the linen tag is written, in order that the duplicate impression on the paper tag may be made at the same time as the original. A medium hard pencil should be used and special care exercised that the name of the patient or of the deceased is legibly written or printed. After the preparation of the tag is completed the carbon paper separating the original and duplicate tags will be torn out and discarded.

When used in time of peace, the tag will be prepared with the same care as to detail as is required in the case of the register card (Form 52, M.D.). Under the

"Diagnosis" will be recorded the essential facts concerning the character of disease or injury, such as fracture, the parts involved, the cause, and severity. In combat there will be many instances when the initial preparation of the tag will be faulty. The tags will be examined by medical officers along the route of evacuation, and every effort consistent with the well-being of the patients need be made to complete and correct the entries. In the case of wounds received in action with an enemy of the United States, or as a result of an act of such enemy, the diagnosis will include a statement to that effect recorded as "Wounded in action" (WIA) and in the case of the dead found on the field, the entry "Killed in action" (KIA) will be made, it being understood that these are administrative rather than medical entries and that a complete diagnosis is required. It is important to remember that awards of compensation and decorations are dependent upon this record. See paragraph 11, AR 604-45, and AR 600-95.

Under "Treatment" will be noted the dressing applied and whether operation or special treatment is urgently needed. The administration of morphine or antitetanic serum will be noted in the separate spaces provided for that purpose.

Under "Supplemental record," on the back of the original, will be recorded as the case may require:

The additional treatment given *en route* to hospital, indicating its nature and where and when it was given.

The fact, time, and place of death and other essential attending circumstances, if the patient dies while *en route*.

The hospital where the patient was admitted for definitive treatment, or the disposition of the body.

The fact that the soldier is returned to duty from any station along the route of evacuation, prior to admission to a hospital. All entries will be signed.

How attached. The original tag will be torn from the book and affixed to the clothing of the patient (or clothing of the dead, as the case may be) over the breast, or as near to it as possible, so as to be readily seen.

Use in transfer of patient. An emergency medical tag will be attached to every patient evacuated to a hospital from an aid station, dispensary, or establishment other than a hospital, in a theater of operations in time of war, or in time of peace whenever troops move by rail or take the field to engage in practice marches or maneuvers. The tag will serve the same purpose as the transfer card prescribed for use in time of peace or in the zone of the interior in time of war. Only one emergency medical tag will be attached to any patient. All necessary notes, before admission to hospital, will be made on the one tag.

Use by moving commands. For commands moving, or in the field in time of peace, or for commands on a similar status in the zone of the interior in time of war, the emergency medical tag will be used by the senior medical officer of each command or dispensary in lieu of a report card for all cases terminated by death or return to duty during the month. Any patient who is transferred from such commands to a hospital will be accompanied by an emergency medical tag. If a patient is transferred to other than an Army hospital, request will be made by the transferring officer that the hospital diagnosis, the complications, operations, and disposition, with dates, be entered in the supplemental record, that the tag accompany the patient if he is removed to an Army hospital, and that it be mailed to The Surgeon General, Washington, D. C., if the patient is released from the hospital to duty.

Each emergency medical tag received with transferred cases by a mobile hospital or by station, general, or convalescent hospitals in a theater of operations, will be placed in the field medical jacket and will thereafter form a part of the patient's field medical record.

Use of the E.M.T. for those "killed in action." The term "killed in action" includes those who meet sudden death as a result of battle injuries and all casualties who die before reaching an aid station as a result of wounds received on the field of battle.

Whenever practicable a noncommissioned officer or a qualified private of the medical department should accompany all burial parties and prepare emergency medical tags for

all the killed in action not previously tagged. Medical Department personnel attached to units of the Graves Registration Service will prepare E.M.T.'s, if missing, at initial interments and complete or correct such as are faulty.

Contents. On each tag the army serial number, name, and rank of the deceased (the data being obtained from the identification tag attached to the body) will be written clearly and legibly. In addition to the diagnosis of killed in action (KIA), there should be entered, when practicable, a brief note showing the location of any wounds, such as head, chest, abdomen, arm, forearm, hand, thigh, leg, or foot, with side involved and the character of the causative missile, such as shell, shrapnel, bullet, bayonet, saber, bomb. In case a tag is incomplete in the foregoing or any other particular, Medical Department personnel on duty with the Graves Registration Service or with other burial parties will supply the missing information if it is obtainable. If identification is impossible at time of interment, notation will be made of the Graves Registration Service registration of the body in order that The Surgeon General may have a means of securing additional information at a later time.

Disposition of the originals. The original emergency medical tags of the sick and wounded who are *returned from aid stations to their organizations* without going farther to the rear, will be removed at the aid station and retained for use by the regimental surgeon.

The original emergency medical tags of the sick and wounded who are *returned to their organizations direct from a station on the route of evacuation* will, upon their reporting for duty, be removed for use by the surgeons of their respective organizations. Such tags will be collected and forwarded by the senior medical officer of the establishment or command by whom they are removed, with the next ensuing monthly report of sick and wounded.

The original emergency medical tags of the sick and wounded who are *admitted to a hospital in a theater of operations* will be removed and placed in the jacket of the field medical record. Original emergency medical tags received with patients evacuated to a hospital which maintains a register of sick and wounded will be removed, the fact of receipt and date thereof entered in the supplemental record, delivered to the registrar, and forwarded to The Surgeon General with the next report of sick and wounded. If an E.M.T. is the only field record received with a patient evacuated from a theater of operations to a hospital for definitive treatment in the zone of the interior, it will be forwarded to The Surgeon General within twenty-four hours.

The original emergency medical tags attached to the bodies of sick and wounded who *died while in transit*, or of the *killed in action*, will remain attached to the bodies until interment takes place. See AR 30-1805, 30-1810, 30-1815. If interment is under supervision of the Graves Registration Service, the E. M. T. will be removed by Medical Department personnel and forwarded to The Surgeon General with the next report of sick and wounded. If interment is not under the immediate supervision of the Graves Registration Service but is made by burial parties from the command, the tags will be removed by Medical Department personnel if present, otherwise by responsible persons, and transmitted to the surgeons of the commands of which the dead were members. The E.M.T.'s attached to the bodies of enemy or allied dead will be forwarded to The Surgeon General through such channels as may be prescribed.

After the tag is detached from the patient the wire will be removed from the tag before it is disposed of as directed above.

Disposition of carbon copies. The carbon copies of the emergency medical tags will be assembled and utilized by the senior medical officer of each unit to prepare for the organization commander such a daily list of casualties as may be required in preparing or checking his reports. At the end of each month all the carbon copies, having served the purpose indicated, will be collected and forwarded with the monthly report of sick and wounded to the chief surgeon for transmittal to the surgeon general.

Litter Bearer Squad. This squad is charged with the prompt removal of all seriously sick and wounded from the fighting line and their evacuation by litter to the site of the aid station. It also directs and assists the walking wounded from the fighting line to the

aid station. When necessary, the litter bearer squad searches for, treats, and cares for the sick and wounded.

The litter bearer squad assists the aid station squad of its battalion medical section in the moving and establishing of the aid station.

When the action commences, the litter bearers move forward from the aid station and make contact with the company aid men. They operate along the axis of advance of the companies in the assault echelon of the battalion, evacuating the wounded. They take advantage of the ground and cover, utilizing such covered routes as may be available, such as stream beds or ravines, from the location of assault companies to the aid station. These routes are known as "natural lines of drift."

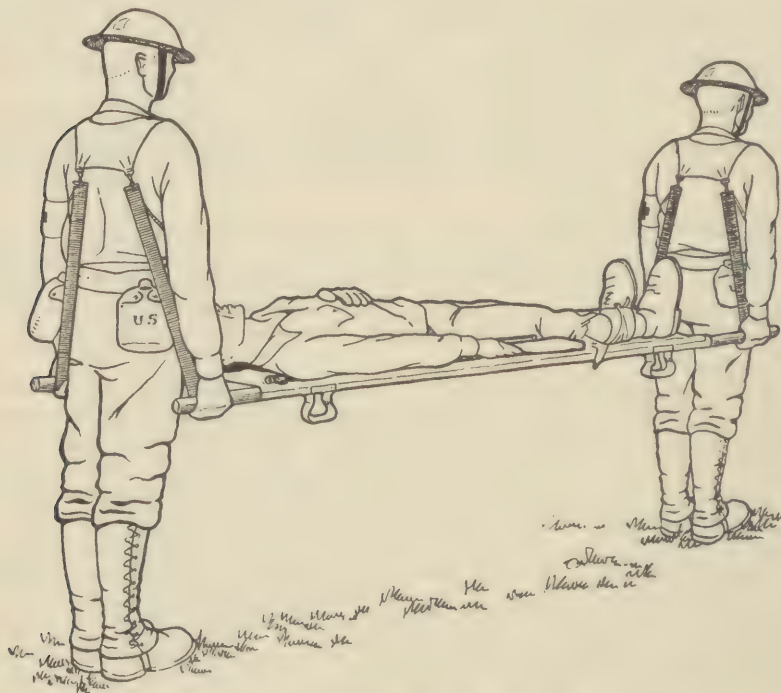


Plate 18. Two-Bearer Litter Squad Carrying Wounded.

The litter bearers serve as messengers between the battalion surgeon at the aid station and the company aid men and vice versa.

Hand litter-carriage is fatiguing work, and casualties among litter bearers are quite numerous. Because of hostile fire, and the laborious task, "evacuation lag" may begin at this point, causing the first interruption in the patient's journey to the fixed hospital. The twelve bearers can handle only three casualties on each trip. It may be necessary to supplement the litter bearers by requesting the detail of prisoners of war, bandsmen, or even riflemen to assist in carrying wounded from the field. Combat troops should be detailed on evacuation duty only as a last resort and only when such employment does not interfere with their combat duty.

Battalion Aid Stations. Battalion aid stations are operated by aid station squads. The principles governing the establishment and operation of battalion aid stations are:

Battalion aid stations are established in combat when there is no steady progress or when progress is very slow.

Only such part of the aid station is established as immediate circumstances require or for which imperative need can be foreseen.

Personnel operating aid stations must keep in constant contact with the combat units they serve.

The aid station prepares casualties for further evacuation. It is not a proper place for the initiation of elaborate treatment of surgical cases. The treatment given should be such as will not greatly retard the flow of casualties through the aid station.

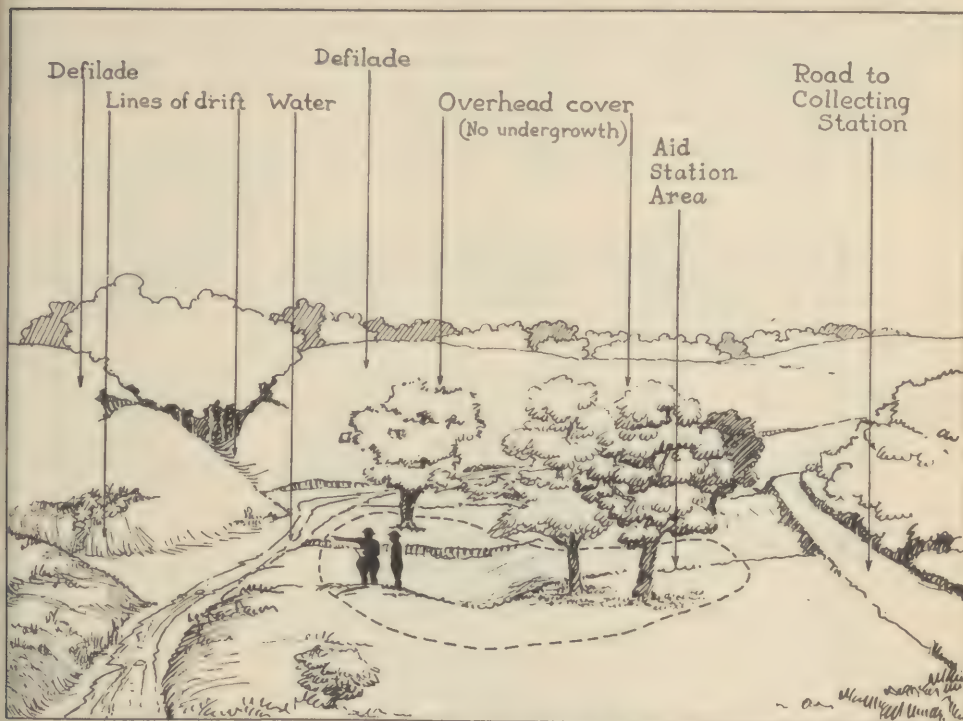


Plate 19. A Desirable Aid Station Site.

Medical property evacuated with patients must be replaced by exchange with the next medical echelon to the rear.

The main functions are: sorting of the wounded; rendering of first aid or supplementing the first aid already given; and keeping a record of the sick and wounded.

Selection of aid station sites. The ideal site for an aid station is a sheltered location at the center rear of the unit served, between 300 to 800 yards (there is no prescribed distance) from the front line, with covered routes of movement front and rear, and a supply of water. In the selection of the actual aid station sites, the following features should be kept in mind:

Desirable

Shelter from enemy fire and observation.
Proximity to natural lines of drift of wounded.
Ease of contact with combat troops.
Ease of communication with the rear.
Economy in collecting and litter bearing work.
Ease of advancement of station to front or rear.
Proximity to water.
Protection from the elements.
Use of lights at night (yet invisibility from enemy on ground or in air).

Undesirable

Enemy observation and fire.
Close proximity to bridges, cross roads, ammunition dumps, ration distributing points, artillery positions, and permanent landmarks.

To select the proper site for an aid station, it is necessary for the battalion surgeon to make an estimate of the situation which includes: the disposition, strength, and mission

of the troops to be served by the battalion aid station; whatever is known of the enemy and his capabilities; nature of the terrain involved.

The tactical employment of the combat units served is the determining factor in the selection of the aid station site; therefrom, the battalion surgeon can determine the localities where the bulk of the wounded ("areas of casualty density") will probably be found. Consequently, he will attempt to place his aid station behind these localities.

The site is finally decided upon by the battalion commander, upon recommendation of the unit surgeon. This is essential to avoid any disagreement or conflict with other installations of the battalion or units attached or in support.

Interior arrangement of the aid station. The space in which the aid station is established should be allotted to the various activities of the aid station in such a way as to permit

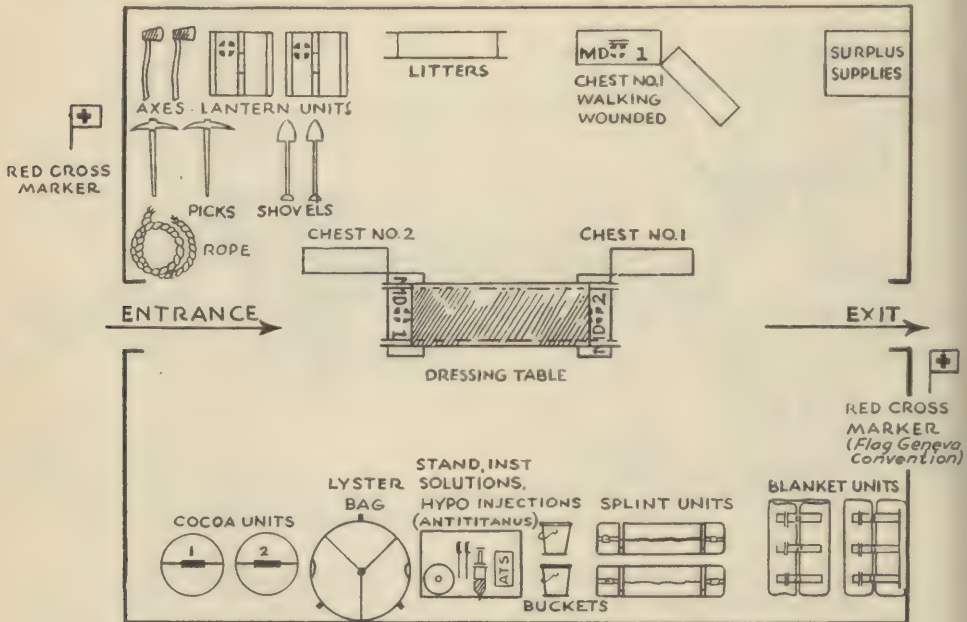


Plate 20. Conventional Floor Plan of an Aid Station.
(As established in a building or tent).

their functioning in the most efficient manner. At the entrance to the aid station site is located a receiving space or area; at the opposite end, a forwarding space. In the receiving space is the record clerk who keeps a blotter of casualties. Ample space should be assigned for dressing cases. A kitchen space should be provided where hot drinks may be prepared for the wounded. A suitable layout for an aid station in a tent or area is shown in Plate 20. It must be remembered that this is purely diagrammatical and in no way indicates a definite arrangement, since in combat consideration must be given for separation of operating personnel in order to avoid excessive casualties by a shell explosion within the aid station area. Grouping of the personnel and the equipment should be prohibited except as necessary for operation.

Functioning of the Aid Station. The aid station is the beginning of the route of evacuation. To it the battalion medical section litter bearers bring the wounded they have collected from the combat companies. Here the wounded are dressed, sorted, and returned to their companies or made ready for further evacuation to the rear.

Sorting is an important function. Malingers and those with slight wounds are returned to their companies. Men disabled for combat but able to walk are directed to the

collecting station evacuating the aid station. This is best accomplished by having them follow litter bearers from the collecting company. Seriously wounded men are turned over to litter bearers from the collecting company to be carried to the collection station.

Only *emergency treatment* is given at the aid station. Hemorrhage is arrested, bandages readjusted, antitetanic serum administered, and emergency medical tags attached and verified. For example, patients arriving at the aid station, who have received first aid treatment from a member of the company aid squad or of the litter bearer squad, have

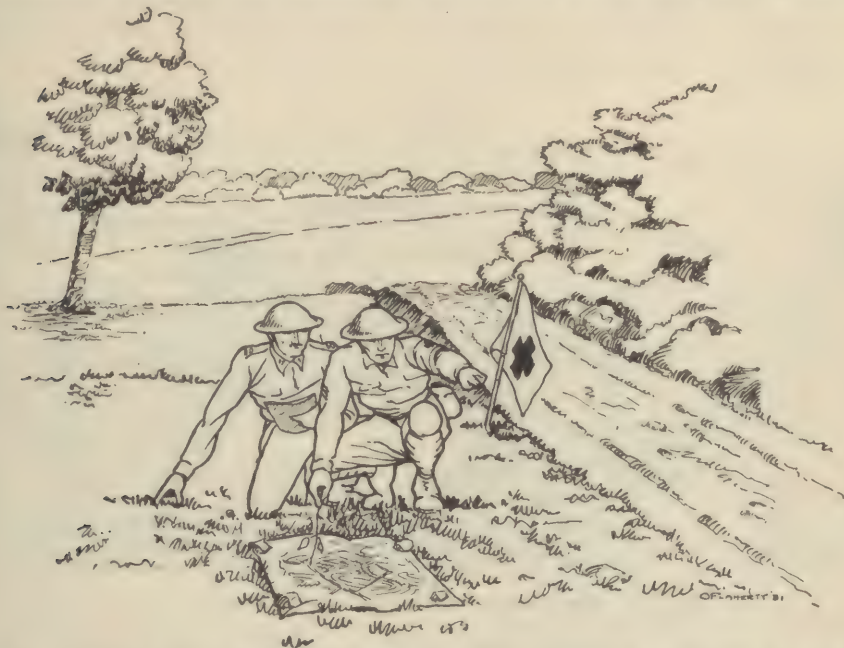


Plate 21. Contact Agent from Collecting Company Reporting Location of Collecting Station.

their dressing inspected and receive any further treatment indicated. Many of the wounded will arrive at the aid station without having contacted either, and some of them will have applied the dressing from their own first aid packet. Those having had no treatment will be attended as necessary for further evacuation. Surgical operations are rarely attempted except for those cases where immediate operation is imperative to save life or to insure future recovery.

Records are kept of all cases passing through the aid station. The total casualties on the blotter are frequently noted and the battalion commander and regimental surgeon kept informed as to the losses. The station blotter is simply a note book showing the designation of the individual, the nature of his wound or wounds, and the disposition made of the case, such as: duty, collecting station, or died.

The regimental medical detachment is not responsible for evacuation to the rear but does cooperate in maintaining contact with the collection company through the contact agent who has been sent forward from the collecting company for that purpose.

The Regimental Aid Station. The regimental aid station is established by the headquarters regimental medical detachment to render medical service for all personnel in and about the regimental command post. This station is established only as required in any given situation. It is not normally a link in the evacuation of wounded from aid stations established by battalion medical sections. When establishment is not indicated, all personnel and equipment are held in regimental reserve. Partial or complete establishment of the regimental aid station may be indicated to care for the situation while the battalions of the regiment are moving forward to their positions in line, or to take over

the functions of a battalion medical section in order that the battalion medical section may keep contact with the battalion it serves. The regimental aid station may be established during periods when it is desirable for the battalion medical sections to be kept mobile, such as in a bivouac or assembly area just prior to combat.

Communication Available for the Regimental Medical Detachment. In battle, it is often very difficult to locate and maintain communication with other elements in the chain of evacuation. Responsibility for communication, or contact, is normally from rear to front.



Plate 22. An Aid Station in Operation (One View).

Legend: (1) Litter bearer squad. (2) Receiving. (3) Records. (4) Water. (5) Dressing table. (6) Instruments and solutions. (7) Dressing stand for treatment, walking wounded. (8) Surplus supplies. (9) Litters, splints and blankets. (Continued on Plate 23.)

Within the regimental medical detachment, contact is made as follows:

Between regimental and battalion surgeons, by personal contact or by runner from the headquarters section of the regimental medical detachment.

Between battalion surgeon and battalion commander, by personal contact or by messenger furnished from the battalion medical section and stationed at the battalion command post.

Between aid station and forward companies, by litter bearers, by messages from company aid men, or by walking wounded.

Between aid stations and collecting companies of the medical regiment, ordinarily by contact agent from the collecting company (See Plate 21) and litter bearers from the collecting company. While the collecting company has the responsibility of making and maintaining contact with the aid stations, the battalion surgeon takes all necessary precautions to insure that such contact is made and maintained.

Reinforcement and Replacement of Personnel. Under the authority of the regimental commander, the regimental surgeon may transfer individuals from one of his sections to another in order to meet existing conditions. He may request reinforcements for his detachment when he foresees the need. All surgeons are authorized to call upon the next medical unit in their rear for replacement of personnel, and that unit furnishes such personnel as can be spared. This procedure then extends to the next medical unit in the rear.

Supplies and Equipment. The regimental surgeon has a responsibility for the medical supply of the regiment. Except for emergency supply in combat he submits a requisition

through the supply officer of the regiment. The latter officer signs the requisition for the regimental commander and sends it to the division medical supply officer. The division medical supply officer fills the requisition, sending the supplies to the infantry regiment's distributing point for Class-I supplies, where in turn these medical supplies are delivered to the various medical units requiring them.

Emergency supplies. In emergencies and during combat, requisitions for medical supplies are made in the form of informal requests upon the next medical unit in rear. A battalion surgeon would thus call on the headquarters section of the regimental medical detachment or on the collecting station evacuating the aid station. Replenishment of such stock issued is secured similarly from medical elements farther to the rear.

In Attack

Plans for the Employment. In attack situations, conditions will usually permit the making of complete plans for participation by the regimental medical detachment. The regimental commander's plan of action should be carefully studied, coordination with the combat units provided for, and detailed plans covering all phases of the medical detachment's participation in the action carefully formulated.



Plate 23. Another View of the Same Aid Station.

Legend (continued from Plate 22): (10) Exchange property arriving from collecting station. (11) Forwarding. (12) Forwarding, gas patients. (13) Wheeled litter. (14) Collecting company personnel evacuating litter cases to ambulance loading post for conveyance to collecting station.

Employment of the Headquarters Section of the Medical Detachment. The headquarters section of the medical detachment should be held in a position in readiness near the regimental command post. In certain situations it should retain its full mobility and be prepared to supply and reinforce the separate battalion medical sections serving the battalions of the regiment. Aid station material should be made readily available for the care of such casualties as may occur in the vicinity of regimental command posts. In certain other situations the regimental aid station is established early in order that care and treatment may be given the wounded during the initial stages of the advance and before

the establishment of battalion aid stations has been effected. In that capacity they assist in keeping the battalion medical sections mobile, allowing them to follow their respective battalions in the attack.

Establishment of the Battalion Aid Station in Attack. The battalion medical sections follow their respective battalions into position. Aid stations are fully or partially established in the most advantageous positions to serve their respective battalions. If a strong and well maintained resistance is expected, aid stations should be located on or slightly to the rear of the line of departure. When the enemy is weak, and when little resistance is expected, the aid station squad may follow the attacking troops forward from the line of departure some distance before attempting to establish an aid station. Such action tends to diminish the work of the litter bearers during the early stages of the action and may make early movement and reestablishment of the aid station unnecessary. Premature establishment of the aid station should be avoided. Ordinarily, equipment should not be completely unpacked until the wounded begin to arrive; otherwise the aid station might, with the changing aspect of the battle, be immobilized in a place where it could not realize its full usefulness.

Company Aid Men in Attack. Company aid men (2 to each combat company) follow their companies into action. Companies often attack with 2 platoons in the assault echelon and 1 platoon in support. Company aid men attached to companies take position to the immediate rear and center of each platoon in the assault echelon and in so far as is practicable maintain this position throughout the attack. This personnel is not provided with litters. The duties of company aid men during the attack are as follows:

- Maintenance of contact with the companies to which assigned.

- The forwarding of information to their respective battalion surgeons by litter bearers or by walking wounded. This information will include progress made by their companies in the attack, their exact location on the terrain, and the approximate number of casualties occurring in each company.

- Administration of first aid and the tagging of the sick and wounded.

- Examination and tagging of the dead and the marking of the position where they lie. The dead soldier's rifle or bayonet is stuck in the ground and his cap or helmet is hung from the upper end.

- Instructing the sick and walking wounded concerning the exact site of the aid station and the proper route to be used in proceeding thereto.

- The placing of all seriously sick and wounded on the central axis of the advance of the company which they serve. In so doing all advantage should be taken of sheltered positions.

The position of the seriously wounded left on the axis of advance may or may not be marked, depending on standing orders and the ability or inability of the enemy to observe such procedure. Wounded requiring movement to the axis of advance or to projected positions on the terrain will be attended to as time permits.

Company aid men assigned to the *heavy weapons company* of the battalion may be widely separated and unable to work together in the care and removal of the wounded. For this reason they should be given more detailed instructions and taught to work independently. In general, they function in the same manner as do company aid men attached to the rifle companies of the battalion.

Litter Bearer Squad in Attack. As soon as action commences the litter bearer squad of the battalion medical section moves forward from its position in the vicinity of the aid station with instructions to follow along the axis of advance of the battalion, to make contact with company aid men when this can be accomplished and to clear the battle area of all wounded. As the attack progresses, this squad operates along the axis of advance of each company in the assault echelon of the battalion, evacuating the wounded from such lines to the aid station.

Where all distances are short this squad may use 6 litters (2 bearers to each litter), but later in the attack when the distances are greater, they should use 3 litters (4 bearers to each litter).

DISPOSITIONS OF BATTALION MEDICAL SECTION DURING ATTACK

*Infantry formations**Medical section formations*

1st Phase. Advance in route column and development.

Column of threes.

Company aid men with companies to which attached. Aid station squad, litter bearer squad, and medical truck following in rear of battalion.

2d Phase. Approach march (desultory shelling).

Lines of small columns, usually squad columns.

Company aid men with companies to which attached. Section, less aid squad, following the battalion reserve. Aid station material being transported by truck or by hand.

3d Phase. Approach march, and deployment (heavier shelling and long range machine gun fire).

Usually squad columns, occasionally infiltration, and skirmish lines.

Company aid men closely following the assault companies to which attached. Battalion surgeon makes local reconnaissance for aid station site. Aid station squad held in position in readiness. Litter bearer squad following the axis of advance of the assault companies.

4th Phase. Advancing the attack (heavy fire of all kinds).

Attack formations; usually skirmish line, occasionally infiltration.

Company aid men following the assault companies to which attached. Aid station squad in position in readiness or establishing station. Litter bearer squad following assault companies.

5th Phase. Assault.

Attack formations.

Company aid men temporarily held up in rear of assault companies. Aid station already established. Litter bearer squad following assault companies.

6th Phase. Reorganization to continue the attack.

Temporary defensive formation. Security detachments.

Company aid men join companies to which attached. Aid station getting ready to move, or moving forward to obtain closer contact. Litter bearer squad clearing ground up to this place.

7th Phase. Pursuit.

Approach march or attack formations.

Company aid men with companies to which attached. Litter bearer squad following the axis of advance of the battalion. Aid station squad moving forward in close contact with the rear elements of the battalion.

8th Phase. Organization of the ground (in lieu of pursuit).

Defensive formations.

Company aid men with companies. Litter bearer squad maintains contact with company aid men and continues evacuation of sick and wounded. Aid station is established in most suitable location.

When additional litter bearers are attached to the regimental medical detachment, the regimental surgeon may hold the attached group of litter bearers as a reserve in the vicinity of the headquarters section of the regimental medical detachment, sending squads forward to act as litter bearers only as actually needed. One or more squads may be attached to each battalion medical section or all may be assigned to one battalion medical section when their need is anticipated.

Employment of the Regimental Medical Detachment during the Progress of the Attack. As the attack progresses, the battalion medical sections move forward in order to maintain contact with the battalions they serve and to reduce the length of the litter-carry. The aid station may move in two parts by "leap-frogging," or it may, if clear of patients,

follow its battalion intact. During rapid movement, wounded, after having been given first aid, may be left on the site to be found, cared for, and evacuated by the collecting company of the medical regiment as it comes forward.

When the regiment attains its principal objective, combat activity often diminishes and the troops proceed to the consolidation of their new positions, pending orders to resume the attack or initiate pursuit, or they take up the defensive in the positions they have reached. During this period the regimental medical detachment clears the regimental area, checks all medical supplies, and sends requests to headquarters regimental medical detachment for replacements.

Further activity of the regimental medical detachment depends upon the continuance of the attack or other tactical plan. If the attack is continued the employment of the regimental medical detachment conforms to the foregoing. If the combat troops take up defensive action in their new positions the regimental medical detachment is employed as in the defense. If the troops withdraw from the newly obtained positions the medical detachment is employed as stated in the discussion on retrograde movements.

The accompanying table (page 569) illustrates the various dispositions of the battalion medical section serving an infantry battalion during the attack.

In Defense

Defensive situations usually afford time and opportunity for a thorough organization of the medical service within the area occupied by the regiment. In this type of action certain special features enter into the administration of the medical service, these becoming particularly important in a prolonged defense of a zone and of less importance as the defense becomes more temporary in character. There is usually sufficient time for a

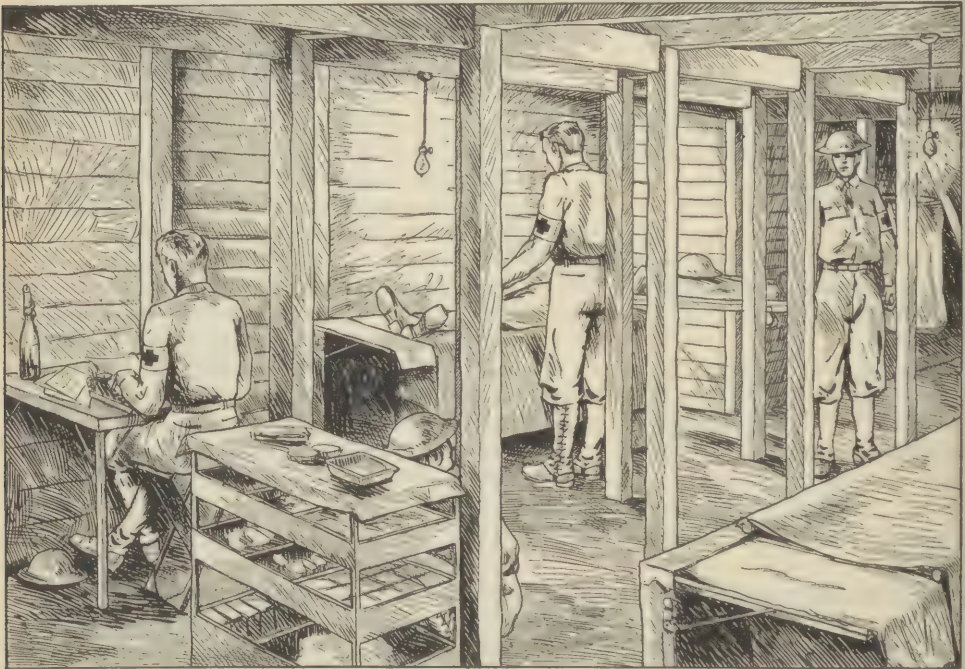


Plate 24. Aid Station in a Dugout Shelter (Stabilized Warfare).

systematic reconnaissance of the entire area occupied by the regiment and for the preparation of medical plans of operation. Dispositions should be made in such a manner as to give efficient medical service and at the same time permit relief, rest, and further training of medical personnel. All positions should be progressively improved from the

hour of occupancy. When necessary, shelter is constructed for aid stations and overhead cover provided as a protection to stations, equipment, and personnel.

Headquarters Section of the Regimental Medical Detachment in Defense. The regimental surgeon's office and the regimental aid station are located in the vicinity of the regimental command post, the extent of the aid station establishment being determined by the duration of the defense, the distance of the position from the front, and whether or not this station is to constitute a link in the chain of evacuation of casualties from the regiment.

Battalion Medical Section in Defense. The *aid station squad* establishes in the rear position of the battalion center of resistance in the best obtainable position a completely equipped aid station, the distance of such positions from the front being dependent upon the dispositions of the combat troops, the nature of the terrain, and the natural lines of drift for the wounded from the front.

The *litter bearer squad* of each battalion medical section makes and maintains contact with company aid men in their respective positions with the combat companies, and continues to evacuate by litter all sick and wounded unable to walk to the aid station.

The company aid men of the *company aid squad* remain with the companies to which assigned, and when the duration of the defense permits they organize small *company aid posts* within each company area. Such aid posts may contain little equipment other than a few additional dressings, but they constitute points where the company sick and injured may be given first aid treatment through the combined efforts of the *company aid men*. During the entire period of the defense one company aid man from each company is required to report in person at the aid station maintained by his battalion medical section at least once daily for the purpose of giving information and obtaining instructions.

Contact with Battalion Commander. The battalion surgeon should maintain close contact with the battalion commander. Large patrols may be sent out, and raids at night may be made into the enemy's position for the purpose of obtaining prisoners and information. The surgeon should have full information concerning such activities to enable him to cooperate in the best possible manner and to provide care and evacuation for the casualties which may result. A defense often terminates in some other type of action, therefore medical officers must inform themselves concerning the general military situation and the plans of their respective commanders.

In Retrograde Movements

A retrograde movement is a movement away from the enemy. This includes withdrawal from action by day or night, delaying action, and retirement. See Chapter V, Part I. It is a planned action to improve the tactical disposition of the command.

Regimental Medical Detachment in Retrograde Movements. The extent of the employment of the medical detachment during a retrograde movement is influenced by the manner in which the movement is accomplished, the activities of the enemy, the strength of the covering force, the location of the covering positions to be occupied, the location of the assembly area in the rear, the rapidity of troop movement, and the effectiveness of the delaying action. Sections of the regimental medical detachment maintain contact with and continue to render medical service for the organizations which they serve.

Headquarters section of the regimental medical detachment. The headquarters section remains in close contact and continues to serve regimental headquarters personnel. If already established at the beginning of a retrograde movement, the regimental aid station may become a very important link in the chain of evacuation of casualties. If not established all aid station equipment should be packed and the headquarters section should be prepared to move to a new position without delay. During phases of the movement the headquarters section may be called upon to augment the work of the battalion medical sections or to establish an aid station at some point in the rear through which to evacuate casualties from the regiment.

Battalion medical section. The battalion medical sections remain in contact and continue to serve their respective battalions. If the covering or delaying position is occupied

by a battalion it is accompanied by its respective battalion medical section. The battalion aid station is partially established well to the rear of the position, providing the defense is relatively strong and the hostile pursuit slow and weak. If the reverse is the case the battalion medical section serving the battalion will be able to accomplish little more than the first aid treatment of casualties and their removal to a designated collecting point, preferably near a roadway over which troops pass in proceeding to the rear. The battalion medical section transportation is held at or conveniently near to the site of the aid station, and every effort is made to keep it mobile.

In a withdrawal from action the movement of battalion medical sections or squads thereof, serving units in contact with the enemy, conform to the movement of such units. If the movement is rapid no attempt is made by the *aid station squad* to establish an aid station, but selected collecting points should be designated along the battalion's axis of withdrawal. The aid station squads of battalion sections occupy such points and provide emergency treatment for the largest possible number of casualties. As units in contact with the enemy approach these points in their withdrawal the positions are vacated and the aid station squads proceed to the designated *collecting points* next in the rear, taking with them the seriously wounded. Every effort is made to prevent large numbers of wounded from falling into the hands of the enemy. When this cannot be avoided the surgeon considers the necessity of leaving a minimum number of medical personnel, together with medical supplies, on the field in order that the wounded may receive early medical attention as prisoners in the hands of the enemy.

When the delaying positions are occupied by one or more companies, such companies are followed into position by the *company aid men* originally attached, who combine their efforts, establish collecting points for the sick and injured, and care for the casualties in the same manner as prescribed for troops in a defensive action.

When the battalion medical section is thus divided, the battalion surgeon may order his assistant to direct and supervise the work of isolated groups of medical personnel, *company aid men*, and *litter bearers* of the section. The litter bearers will bring as many casualties to the designated collecting points as they are able to transport.

Contact with collecting station. It is highly important in all retrograde movements that the collecting company charged with the evacuation of the sick and wounded from the regimental area maintain close contact with aid stations and *collecting points* established by the headquarters regimental medical detachments and battalion medical sections.

With Troops Not in Contact with the Enemy. Troops not in contact with the enemy, or occupying selected covering positions, proceed to the designated assembly point accompanied by their attached medical personnel. The disposition of such medical personnel conforms to that prescribed for normal march formations.

Following the Retrograde Movement. Following the retrograde movement the regiment may occupy a new defensive position, or the movement may simply initiate a retirement. If the troops occupy a defensive position or delaying position the regimental medical detachment is employed as in defense, arriving at the new positions at the same time as the unit served. If the movement initiates a retirement the employment of the medical detachment conforms to the principles as prescribed for troops on the march.

EMPLOYMENT OF THE ATTACHED MEDICAL PERSONNEL WITH UNITS OTHER THAN INFANTRY

The basic principles for the tactical employment of regimental medical detachments attached to regiments of infantry are, in so far as practicable, applied in the control of regimental medical detachments of regiments of field artillery, cavalry, and other arms. Similarly, the basic principles of interior organization, tactical employment of regimental medical detachments of infantry, cavalry, and field artillery regiments in garrison, on the march, in camp, and in combat are followed in the interior organization and tactical employment of all regimental medical detachments attached to *quartermaster units*, *combat engineer regiments*, *ammunition trains (artillery)*, and *special troops* of the infantry division.

Artillery

Regimental Medical Detachments with Artillery. For tactical employment in the field, the regimental medical detachment serving a regiment of field artillery is divided into a headquarters section, 2 or 3 battalion medical sections (a section for each battalion), and a veterinary section (if a horse-drawn or mounted artillery regiment). See organization of regimental medical detachments with artillery.

In Garrison and on the March. With troops in garrison, on the march, or in permanent or semi-permanent camps, the service rendered by the regimental medical detachments attached to regiments of artillery is the same as for regimental medical detachments attached to infantry regiments.

Headquarters Section of the Regimental Medical Detachment. In combat the headquarters section of the regimental medical detachment and regimental aid station are established at or near the rear echelon of the artillery regiment (or division artillery). From this position the regimental surgeon maintains contact with artillery headquarters and with each battalion medical section, supervising, reinforcing, and to a limited degree supplying these latter units with medical supplies and material. The *regimental aid station* is established by personnel of the headquarters section and may or may not constitute a link in the chain of evacuation of casualties from the regiment.

Battalion Medical Section. Battalion medical sections follow their respective artillery battalions into position, establish aid stations, and make contact with their respective battery aid squads. The *battalion aid station* sites should conform to the same requirements as those of the infantry battalion. They should never be established near ammunition dumps or in close proximity to the designated parking places for artillery caissons and combat trains. They may be established near roadways, but always between and not at important points such as road junctions and crossroads. A road leading to or from the immediate vicinity of the aid station is highly desirable, since this allows evacuation by ambulance. With few exceptions, as related in paragraphs below, aid stations of artillery units function in the same general way as do aid stations serving infantry units. Ambulances are normally part of the regimental medical detachment transportation and, therefore, may be used to evacuate patients from the battery positions (when practicable) and from the aid station to facilities of the medical regiment serving the division. In some instances the aid station may be so located as to be readily accessible to ambulance service of the medical regiment.

Litter bearer squad. All sick and wounded unable to walk must be evacuated from battery positions by the litter bearer squad or by additional help from the aid station squad or company aid squad when unusual activity develops or when the litter-carry is long. In favorable situations the sick and wounded may be evacuated directly from battery positions by ambulance. Ambulances are normally part of the transportation of regimental medical detachments of artillery regiments.

The battery aid squad. Two battery aid men are attached to each battery of artillery. They are the first to see the sick and wounded in battery positions. They give them emergency treatment and care for them until they can be evacuated. The battery aid men eat and sleep with the personnel of the artillery batteries to which they are attached during periods of activity and return to their respective battalion medical sections only at such times as the regiment is brought together for rest or training. They are trained and instructed in the same manner as are company aid men attached to companies of infantry. When a battery remains in one position for a considerable period of time battery aid men obtain a small surplus of medical supplies with which to establish local *aid posts* within or nearby their respective battery positions. Each battery aid man is instructed to care for the casualties occurring in his own platoon, and for the accomplishment of this work takes position in or close to the gun emplacement of his particular platoon when the guns are being fired or when the position is being fired upon by the enemy. Casualties occurring in gun pits are immediately removed to a place of greater safety, given first aid, tagged, and carried by litter bearers or directed to the position of the battalion aid station. In all stabilized or partially stabilized situations battery aid men are required to report at least

once daily at the battalion aid station for the purpose of giving information and receiving instructions.

The Veterinary Section (For Horse-drawn or Mounted Units). The veterinary sections furnish veterinary service for all units within the combat zone having animals as part of their organization.

Veterinary Aid Station. The veterinary aid station is operated by the veterinary section. In situations where two veterinary aid stations are needed, two battalion sections are separated, and each operates a battalion veterinary aid station. The functions of and the principles governing the establishment and operation of veterinary aid stations follow closely those applicable to the medical service.

The veterinary section is the foremost veterinary unit in the evacuation of animals. At the veterinary aid station the veterinary section:

- Receives and records animal casualties.

- Examines, sorts, and applies first aid to disabled animals.

- Returns to the proper organization animals able to do further duty.

- Prepares sick and wounded animals for further evacuation.

- Destroys injured animals which cannot be salvaged.

Animals to be evacuated are collected by personnel from the veterinary units further to the rear, who make and maintain contact with veterinary aid stations.

Principles governing the establishment and operation of the veterinary aid station:

Veterinary aid stations are established in combat when required to relieve units of sick and wounded animals.

Aid stations maintain contact at all times with the combat unit they serve.

The aid station is the proper place to give first aid and emergency treatment; it is not the proper place to undertake definitive treatment of any kind.

Each animal evacuated should be equipped with a halter and halter-shank, and, if needed, a blanket.

Usually but one veterinary aid station is established per regiment. In case a regiment is operating with widely separated battalions or squadrons, the sections and equipment are divided and two aid stations established.

The location of the veterinary aid station. The most suitable site for the veterinary aid station is at or near the point where the majority of the animals of the unit are assembled. When combat is imminent the unit veterinarian reconnoiters the regimental zone of action for suitable sites for the veterinary aid station, keeping in mind the following desirable features:

- Shelter from enemy fire and observation.

- Location in the vicinity of the greatest concentration of animals.

- Proximity to water.

- Routes for evacuation by the veterinary personnel from rear veterinary units (veterinary troops of the medical squadron or the veterinary company, separate) without interference with other transportation.

- Protection from the elements.

As a result of the reconnaissance the unit veterinarian recommends to the unit surgeon one or more suitable locations for the veterinary aid station; the surgeon submits this to the unit supply officer for coordination. This is done informally. The aid station is established at the approved location as soon as the regiment to which the veterinary section is attached, is in position. Only such part of the aid station is established for which the need can be foreseen.

Functioning of the veterinary aid station. Personnel not designated as veterinary aid men work at or from the veterinary aid station. The unit veterinarian directs the work at the aid station, keeping in touch with the animal casualty situation. The junior officer, if present, directs the collection of casualties, sending forward men at opportune times to bring back animal casualties to the veterinary aid station. The noncommissioned officer remains with the aid station at all times; he receives, sorts, and records casualties and prepares the emergency veterinary tags. In the detachments with field artillery and

cavalry, veterinary men may be attached to battalions or squadrons during combat. In mounted cavalry action it may be advantageous to attach one to each troop. These veterinary aid men follow their units into battle, give first aid treatment, tag sick and wounded animals, and place them in sheltered positions where they can be located by the veterinary aid station personnel.

<p>Tag No. <u>12</u> Classification <u>BAABA9</u> No. <u>B490</u> <u>Wound</u> Horse <u>B490</u> Organization <u>Troop A 7th Cav</u> Division <u>1st Cav</u> Date mallein test <u>Nov 25, 1938</u> Date tagged <u>May 2, 1939</u> DIAGNOSIS: <u>Wound, penetrating,</u> <u>severe, mid. 3d Sole R.H.</u> <u>Caused by street nail while</u> <u>on maneuver near Cox's Well,</u> <u>N. M., May 2, 1938</u> COMPLICATIONS: <u>J. A. Doe, Capt. V.C.</u> <small>(Name) (Rank)</small> Form 115b MEDICAL DEPARTMENT, U. S. A. (Revised Apr. 15, 1938) 3-5887 ORIGINAL </p>	<p>Tag No. <u>12</u> Classification <u>BAABA9</u> No. <u>B490</u> <u>Wound</u> Horse <u>B490</u> Organization <u>Troop A 7th Cav</u> Division <u>1st Cav</u> Date mallein test <u>Nov 25, 1938</u> Date tagged <u>May 2, 1939</u> DIAGNOSIS: <u>Wound, penetrating,</u> <u>severe, mid. 3d Sole R.H.</u> <u>Caused by street nail while</u> <u>on maneuver near Cox's Well,</u> <u>N. M., May 2, 1938</u> COMPLICATIONS: <u>J. A. Doe, Capt. V.C.</u> <small>(Name) (Rank)</small> Form 115b MEDICAL DEPARTMENT, U. S. A. (Revised Apr. 15, 1938) 3-5887 DUPLICATE </p>	<p>Tag No. <u>12</u> Classification <u>BAABA9</u> No. <u>B490</u> <u>Wound</u> Horse <u>B490</u> Organization <u>Troop A 7th Cav</u> Division <u>1st Cav</u> Date mallein test <u>Nov 25, 1938</u> Date tagged <u>May 2, 1939</u> DIAGNOSIS: <u>Wound, penetrating,</u> <u>severe, mid. 3d Sole R.H.</u> <u>Caused by street nail while</u> <u>on maneuver near Cox's Well,</u> <u>N. M., May 2, 1938</u> COMPLICATIONS: <u>J. A. Doe, Capt. V.C.</u> <small>(Name) (Rank)</small> Form 115b MEDICAL DEPARTMENT, U. S. A. (Revised Apr. 15, 1938) 3-5887 TRIPPLICATE </p>
<p>SUPPLEMENTAL RECORD</p>	<p><u>1st Vet. Troop.</u> <u>Evacuated to One Grande, N. M.</u> Date <u>May 2, 1939</u> <u>Vet Station Hospital,</u> <u>Evacuated to Fort Bliss, Texas</u> Date <u>May 3, 1939</u> Evacuated to Date Evacuated to Date FINAL DISPOSITION: <u>Taken up on</u> <u>Form 115, M. D., Register</u> <u>No. 12294.</u> TOTAL DAYS TREATMENT: <u>12.</u> Date <u>May 14, 1939</u> <u>H. J. Linton, Major, V.C.</u> <small>3-5887 (Name) (Rank)</small> </p>	<p>DISPOSITION AND OTHER NOTES</p>

Plate 25. The Emergency Veterinary Tag, Form 115b, M. D.

Front (top row) and back (bottom row) of original, duplicate and triplicate copies, respectively.

Classification of Sick and Wounded Animals. Proper classification is a most important feature of evacuation. Its object is to eliminate the nonsalvageable and to prevent salvageable animals from going farther to the rear than is necessary to secure definitive treatment. Disabled animals are classified as follows:

Salvageable. Those animals amenable to treatment within a reasonable time as follows:

Minor cases which can be returned for duty immediately after treatment.

Moderate cases which promise recovery within three to five days without hampering the mobility of the command.

Severe cases able to walk or undergo transportation, including cases of communicable disease, which might menace the health of other animals. This is the class of animals prepared for evacuation.

Nonsalvageable. Those animals requiring immediate destruction on account of:

Incurable sickness or injury.

Inability to walk, no transportation being obtainable.

Communicable disease of such a nature that treatment is impracticable.

Cavalry

The Regimental Medical Detachment with Cavalry. For tactical employment in the field the regimental medical detachment serving a regiment of cavalry is divided into a headquarters section, 3 squadron medical sections, and a regimental veterinary section.

In garrison or on the march. With troops in garrison, on the march, or in permanent or semi-permanent camps the service rendered by the regimental medical detachment attached to regiments of cavalry is in principle the same as in the case of regimental medical detachments attached to regiments of infantry.

The Headquarters Section of the Regimental Medical Detachment. In combat the headquarters section of the regimental medical detachment usually accompanies the regimental reserve, from which position the regimental surgeon will supervise, reinforce, and to a limited degree supply the squadron medical sections serving the squadrons of the regiment. The medical truck remains with the regimental train until such time as it is ordered forward for the purpose of establishing a regimental aid station. The regimental surgeon should maintain close contact with the regimental commander and with each squadron medical section of the detachment.

The Squadron Medical Section. Squadron medical sections follow closely the squadrons to which attached. The squadron surgeon maintains close contact with each troop of the squadron. When the squadron deploys for action, the squadron medical section, and such personnel as may be attached, take up a position with or near the squadron reserve.

Squadron aid station. With cavalry organizations in combat, aid stations cannot often be established with any degree of assurance that they will long continue to function for the relief of the units which they are designed to serve. In certain special situations aid stations may be definitely established, but in many other situations fully established aid stations do not function properly and tend only to decrease the mobility of the medical unit and to increase the difficulty in maintenance of contact with the troops. The decision as to whether aid stations should or should not be established to cover any given situation must rest with the regimental and squadron surgeons, who are influenced in making such decisions by the relative dispersion of troops, their principal mission, the character of the action anticipated, and the character of the terrain over which the troops will operate.

Aid stations should never be fully established during periods of continued and rapid movement of troops, nor when the dispersion of troops is such that any given aid station will not serve more than one troop, situations which are not unusual in the service of the cavalry.

When cavalry is employed as a covering force, acting as a screen for the advance of troops, conducting distant reconnaissance, or employed in connecting separate armies or parts of armies in their advance, no attempts should be made to establish aid stations except at halts for the night and at such other times as minor contacts with the enemy may produce a grouping of casualties and a temporary cessation of movement.

During combat, when the cavalry regiment or squadron thereof is operating on the enemy's flank, exploiting a break in the enemy's line, filling gaps in the line, or participating in the main battle, aid stations should be partially or fully established. When cavalry

is employed as a covering force they may be partially established, but a high degree of mobility should be maintained.

Troop aid squad. When the squadron medical section is able to utilize troop aid men, they function with each troop of cavalry in the same manner as do company and battery aid men attached to companies of infantry and batteries of field artillery. Two men are usually attached to each troop. Casualties occurring in the troop are first attended by troop aid men, by whom they are examined, dressed, tagged and directed to the position of the aid station squad of the squadron medical section.

Litter bearers may be designated in situations when cavalry may be temporarily dismounted and fight on foot.

Casualties unable to walk are removed to the position of the aid station squad by the use of their own mounts, the travois, the field ambulance of the regimental medical detachment, or by requisitioned, wheeled transportation. Casualties unable to endure transportation are left with medical material and with or without medical attendants in the care of civilian inhabitants.

Medical Service in Dismounted Action. In many situations, such as delaying actions, the holding of strategic points, or when cavalry units go to the assistance of hard-pressed infantry, cavalry may be temporarily dismounted to fight on foot. This is known as dismounted action of cavalry, and throughout its duration the medical service of the organization is conducted in the same general manner as for like organizations of infantry. Troop aid men should accompany their troops into action. Squadron medical sections may or may not establish aid stations, depending upon the type, probable extent, and probable duration of the action. If aid stations are not established, *collecting points* for the sick and wounded are designated along the axis of movement of each troop or upon the previously designated line of withdrawal of such units.

Medical Service in a Detached Troop. When a single troop of cavalry is detached from its parent organization the troop aid men normally attached remain with it for the purpose of conducting the medical service of the troop. If the troop is to be detached for more than a few days, and is accompanied by a medical officer, a medical and surgical chest or box of medicines and dressings should be carried on one of the trucks accompanying the troop.

Veterinary Sections with Cavalry. The same principles of organization and operation are applicable for the veterinary sections of cavalry as are used for those of horse-drawn artillery. Their equipment is carried on two packhorses, and they can establish one regimental veterinary aid station or two squadron veterinary aid stations. One aid station is usually set up in the rear of the pivot of maneuver, while the other squadron veterinary section follows the maneuvering force in readiness to set up the station when the situation indicates. More often, the detailed squadron is accompanied by one officer, one sergeant, and three privates who are kept available for that purpose. A detached troop may be accompanied by a private first class from the veterinary section. Usually, the unit personnel is kept together near the squadrons supported and assigned as the situations arise which require their services. They may be located with the combat trains when these trains are in close proximity to their units.

Regimental Medical Detachments with Mechanized Units. These organizations are highly mobile units which operate over long distances with considerable dispersion. When operating at a distance from supporting elements, lines of communication may be temporarily interrupted.

Maneuver is the rule for mechanized units, both during combat and for security. Combat is of short duration and is followed by rapid movement. Mechanized units seldom remain with safety in one location when the enemy is present. The personnel remains in the armored vehicles during combat, permitting offensive action and forward movement or a rapid withdrawal followed by an attempt to find a weak point in the enemy line.

Medical detachments therefore must render first aid either in the vehicles or later on the field when the engagement is over. The casualties must be carried on the

vehicles in many instances until they can be evacuated. Litter squads are not provided. Aid stations, rarely established, are but collecting points to which casualties are left by the combat vehicles or brought by the ambulances which are an organic part of these medical detachments.

Attached Medical Personnel with Other Units. Medical detachments of Quartermaster, Engineer, Special Troops, Air Corps, Chemical, Signal, Coast Artillery, and other units have, in so far as practicable and applicable, the same basic principles of interior organization, operation, training, and tactical management in garrison, on the march, in camp, and in combat as related for the infantry and artillery detachments. See current Tables or Organization for personnel strength of officers and enlisted men and transportation.

Tables for Organization for Coast Artillery regiments, antiaircraft (mobile, semi-mobile, and harbor defense), are shown in Plates 26, 27, and 28, respectively.

	1	2	3	4	5	6	7
	Unit	Specialists' ratings (class)	Headquarters section	Battalion section	Total (headquarters section and 2 battalion sections)	Enlisted cadre	Remarks
2	Major.....		1		1		
3	Captain.....		(d1) 2	1	(d1) 4		
4	First Lieutenant.....		d 1		d 1		
5	Total commissioned.....		4	1	6		* May be first lieutenants. * Dental.
6	Technical sergeant (673).....		1		1		Summary of specialists' ratings
7	Staff sergeant, including.....			1	2	1	
8	Section leader (652).....			(1)	(2)	(1)	
9	Sergeant, including.....		1		1		
10	Technician, surgical (225).....		(1)		(1)		
11	Corporal, including.....			1	2	1	
12	Section leader, assistant (652).....			(1)	(2)	(1)	
13	Private, first class.....				12		
14	Private.....		11	12	23	4	
15	Battery aid man (521).....			(5)	(10)		
16	Chauffeur (245).....	5th	(3)		(3)		
17	Chauffeur (245).....	6th	(1)	(1)	(3)		
18	Clerk (055).....	5th	(1)		(1)		
19	Motorcyclist (678).....	5th			(1)		
20	Motorcyclist (678).....	6th		(1)	(1)		
21	Technician, dental (067).....	4th	(1)		(1)	(1)	
22	Technician, dental (067).....	6th	(1)		(1)		
23	Technician, medical (123).....	4th	(1)	(1)	(3)	(1)	
24	Technician, medical (123).....	5th		(1)	(2)		
25	Technician, sanitary (196).....	5th	(1)		(1)	(1)	
26	Technician, surgical (225).....	5th	(1)	(1)	(3)	(1)	
27	Basic (521).....		(1)	(2)	(5)		
28	Total enlisted.....		13	14	41	6	
29	Aggregate.....		17	15	47	6	
30	Q Ambulance, field.....		2		2		
31	Q Motorcycle, with side car.....			1	2		
32	Q Truck, ½-ton, command and reconnaissance.....		1		1		
33	Q Truck, 1½-ton, cargo.....		1	1	3		

Plate 26. T/O 4-11. Medical Detachment, Coast Artillery Regiment, Antiaircraft, Mobile.

	1	2	3	4	5	6	7
	Unit	Specialists' ratings (class)	Headquarters section	1 battalion section	Total (headquarters section and 3 battalion sections)	Enlisted cadre	Remarks
2	Major		1		1		
3	Captain		(^d 1) ^a 2	^a 1	(^d 1) 5		^a May be first lieutenants.
4	First lieutenant		^d 1		^d 1		^d Dental.
5	Total commissioned		4	1	7		
6	Technical sergeant (673)		1		1		Summary of specialists' ratings
7	Staff sergeant, including			1	3	1	
8	Section leader (652)			(1)	(3)	(1)	
9	Sergeant, including		1		1		
10	Technician, surgical (225)		(1)		(1)		Class
11	Corporal, including			1	3	1	Number
12	Section leader, assistant (652)			(1)	(3)	(1)	
13	Private, first class				16		
14	Private		11	12	{ 31 }	4	4th
15	Battery aid man			(5)	(15)		5th
16	Chaufeur (245)	5th	(3)		(3)		6th
17	Chaufeur (245)	6th	(2)		(2)		
18	Clerk (055)	5th	(1)		(1)		Total
19	Motorecyclist (678)	5th		(1)	(1)		26
20	Motorecyclist (678)	6th		(1)	(2)		
21	Technician, dental (067)	4th	(1)		(1)	(1)	The serial number symbol shown in parentheses is an inseparable part of the specialist designation. A number below 500 refers to an occupational specialist whose qualification analysis is found in section I, AR 615-26. A number above 500 refers to a military occupational specialist listed in section II, AR 615-26.
22	Technician, dental (067)	6th	(1)		(1)		
23	Technician, medical (123)	4th	(1)	(1)	(4)	(1)	
24	Technician, medical (123)	6th		(1)	(3)		
25	Technician, sanitary (196)	5th	(1)		(1)	(1)	
26	Technician, surgical (225)	5th	(1)	(1)	(4)	(1)	
27	Technician, surgical (225)	6th		(1)	(3)		
28	Basic (521)			(2)	(6)		
29	Total enlisted		13	14	55	6	
30	Aggregate		17	15	62	6	
31	Q Ambulance, field		3		3		
32	Q Motorcycle, with side car			1	3		
33	Q Truck, 1/2-ton, command and reconnaissance		1		1		
34	Q Truck, 1 1/4-ton, cargo		1		1		

Plate 27. T/O 4-111. Medical Detachment, Coast Artillery Regiment, Antiaircraft, Semimobile.

	1	2	3	4	5	6	7										
1	Unit	Specialists' ratings (class)	Headquarters section	Battalion section	Total (headquarters section 3 and battalion sections)	Enlisted cadre	Remarks										
2	Major.....		1		1												
3	Captain.....		(d 1) 2	a 1	(d 1) 5												
4	First lieutenant.....		d 1		d 1												
5	Total commissioned.....		4	1	7		a May be first lieutenant. d Dental.										
6	Technical sergeant (673).....		1		1		The ambulances required by the detachment will be assigned by the harbor defense commander from the allotment made to his harbor defense in Table of Basic Allowances for the Coast Artillery Corps.										
7	Staff sergeant, including.....			1	3	1											
8	Section leader (652).....			(1)	(3)	(1)											
9	Sergeant, including.....		1		1												
10	Technician, surgical (225).....		(1)		(1)												
11	Corporal, including.....			1	3	1											
12	Section leader, assistant (652).....			(1)	(3)	(1)											
13	Private, first class.....				14												
14	Private.....		9	11	28	4											
15	Battery aid man (521).....			(6)	(18)												
16	Chaufeur (245).....	5th	(1)		(1)		<div>Summary of specialists' ratings</div> <table><tr><th>Class</th><th>Number</th></tr><tr><td>4th.....</td><td>1</td></tr><tr><td>5th.....</td><td>11</td></tr><tr><td>6th.....</td><td>6</td></tr><tr><td>Total.....</td><td>18</td></tr></table>	Class	Number	4th.....	1	5th.....	11	6th.....	6	Total.....	18
Class	Number																
4th.....	1																
5th.....	11																
6th.....	6																
Total.....	18																
17	Chaufeur (245).....	6th	(1)		(1)												
18	Clerk (055).....	5th	(1)		(1)												
19	Technician, dental (067).....	5th	(2)		(2)	(1)											
20	Technician, medical (123).....	4th	(1)		(1)												
21	Technician, medical (123).....	5th		(1)	(3)	(1)											
22	Technician, medical (123).....	6th	(1)		(1)												
23	Technician, sanitary (196).....	6th	(1)		(1)	(1)											
24	Technician, surgical (225).....	5th	(1)	(1)	(4)												
25	Technician, surgical (225).....	6th		(1)	(3)	(1)											
26	Basic (521).....			(2)	(6)												
27	Total enlisted.....		11	13	50	6											
28	Aggregate.....		15	14	57	6											

The serial number symbol shown in parentheses is an inseparable part of the specialist designation. A number below 500 refers to an occupational specialist whose qualification analysis is found in section I, AR 615-26. A number above 500 refers to a military occupational specialist listed in section II, AR 615-26.

Plate 28. T/O 4-61. Medical Detachment, Coast Artillery Regiment, Harbor Defense.

CHAPTER II

THE MEDICAL REGIMENT, THE MEDICAL SQUADRON, AND THE MEDICAL BATTALION

Introduction. The medical regiment, the medical squadron, and the medical battalion are organic medical units of the division and larger organizations. Within the division, they are organized to fit the particular type of division served: the medical regiment for the infantry division, square; the medical squadron for the cavalry division; and the medical battalion for the infantry division, triangular. There are also similar organic medical units for the corps and army. Their administration is similar in all respects to that of any regiment, battalion, or squadron.

Function. Basically, the function of these medical units is to assist in the preservation of the strength of the division, corps, or army of which they are a part. This is accomplished by:

Prompt evacuation of the non-effective sick and injured from all units of the command served.

Adequate treatment and care of the sick and injured until they can be returned to duty or evacuated to appropriate medical installations for further treatment according to their needs.

Maintaining the health of the men in the command served.

Providing medical, dental, and veterinary supplies to all units supported.

THE MEDICAL REGIMENT FOR SQUARE DIVISIONS AND ARMY TROOPS

Organization. The medical regiment is an organic part of the infantry division, square, and army troops. It is organized into:

Regimental headquarters and band.

Headquarters and service company.

1st battalion (collecting) of three companies, identical in organization, transportation, and equipment.

2d battalion (ambulance) of three motorized companies, identical in organization, transportation, and equipment.

3d battalion (clearing) of three companies, identical in organization, transportation, and equipment.

Personnel. Exclusive of the division surgeon's office personnel and chaplains, there are within the medical regiment 66 officers, 1 warrant officer, and 980 enlisted men, a total strength of 1047. (See Plate 1.) According to rank and grade they are as follows:

60 medical officers; 1 colonel (division surgeon and commanding officer of the medical regiments), 4 lieutenant colonels, 1 major, 21 captains (1 may be medical administrative corps officer), and 33 lieutenants (12 may be medical administrative corps officers).

6 dental officers, first lieutenants.

2 attached chaplains: 1 captain and 1 first lieutenant (not included in total).

980 enlisted men; 3 master sergeants, 13 technical sergeants, 29 staff sergeants, 73 sergeants, 46 corporals, 291 privates first class, and 527 privates.

Regimental Headquarters. Regimental headquarters is an agency of command and consists of the commander, the executive officer, the adjutant (S-1), the plans and training officer (S-3), the assistant plans and training officer, two chaplains, and certain enlisted personnel. The commander of the headquarters and service company, being unit supply officer and division supply officer, is also a regimental staff officer (S-4).

The regimental commander. The commanding officer of the medical regiment is directly responsible to the division commander for the efficient administration, discipline, training, and operation of the medical regiment in all situations. He is also the division surgeon. When he is away from regimental headquarters his command duties are performed by the executive officers. As division surgeon, he must maintain close liaison with

1	2	3	4	5	6	7	8	9	10	11	12	13
Unit	Specialists' ratings (class)	Division surgeon's office	Regimental headquarters and band ^a	Headquarters and service company (T/O 8-22)	1st battalion, collecting (T/O 8-25)	2d battalion, ambulance (T/O 8-35)	3d battalion, clearing (T/O 8-45)	Total regiment	Attached chaplain	Aggregate	Enlisted cadre	Remarks
Colonel.....		b 1	b 1					1				
Lieutenant colonel.....		1	1		1	1	1	4		2		
Major.....		(d) 1	2	1				1		5		
Captain.....		e 1	(e) 1	3	3		12	21	1	3		
Lieutenant.....				e 3	(e) 1	e 7	(c) 16	39	1	40		
Total commissioned.....		5	5	4	17	11	29	66	2	73		
Warrant officer.....			1					1		1		
Master sergeant.....		e 1	1	3	3	3	3	13		4	3	
Technical sergeant.....			1	1	10	10	7	29		13	12	
Staff sergeant.....		f 2	4	1	19	13	31	71		29	7	
Sergeant.....			2	2	18	9	46	73		73	19	
Corporal.....				13	110	65	83	291		416	10	
Private, first class.....			{	26	221	113	167	527		294	62	
Private.....		3		(1)				327		327		
Specialist.....	2d			(4)	(12)	(6)	(18)	(1)		(1)	(1)	
Specialist.....	3d		(2)	(6)	(36)	(6)	(27)	(42)		(42)	(22)	
Specialist.....	4th		(5)	(6)	(86)	(6)	(27)	(80)		(80)	(18)	
Specialist.....	5th	(e 3)	(8)	(10)	(63)	(41)	(47)	(169)		(172)	(18)	
Specialist.....	6th		(5)	(7)	(123)	(40)	(32)	(227)		(227)	(3)	
Unrated.....				(73)	(73)	(67)	(79)	(225)		(225)		
Basic.....				(5)	(24)	(18)	(27)	(74)		(74)		
Total enlisted.....		6	28	52	391	213	306	980		986	113	
Aggregate.....		11	34	56	398	224	335	1,047	2	1,060	113	
Ambulance, field, cross country						60		60		60		
Cur, light 5-passenger sedan		1		1				1		2		

^aWarrant officer and enlisted men in this column constitute the band. The regimental band is organized only when specifically authorized; when not present, the total and aggregate strengths of the regiment are reduced accordingly. The band is commanded by the adjutant and is attached to headquarters and service company for administration, mess, and supply.

^bDivision surgeon commands medical regiment. Division surgeon's office not included in the totals of the medical regiment but includes—1 colonel, division surgeon; 1 lieutenant colonel, medical inspector; 1 major, division veterinarian; 1 major, division dental officer; 1 captain, office executive.

^cMedical Administrative Corps.

^dDental.

^eChief clerk (062).

the division staff. This also permits him to keep in close touch with the tactical situation and the medical requirements of the division, thus enabling him to direct effectively the operation of the medical regiment. He submits his recommendations for the employment of the medical regiment to G-4 of the division, and when these recommendations are approved he puts them into execution as regimental commander by issuing orders or instructions to his subordinate commanders. He is responsible for the efficient operation of the medical service of the division because of his dual capacity as division surgeon and commanding officer of the medical regiment. (Discussed fully in Chapter III).

The executive officer. The executive officer is the principal assistant and advisor of the regimental commander. He must have the full confidence of the commander and a complete knowledge of his policies. He carries on much of the routine administration of the medical regiment. He keeps the commander fully informed of all details of administration and operation.

When the commander is present the executive officer performs such duties as are assigned to him. He directs and coordinates the work of other staff officers. He obtains basic decisions from the regimental commander, makes decisions supplementary thereto, and gives the necessary instructions to the regimental staff. He supervises and coordinates the preparation of plans and orders by other staff officers and submits a completed plan to the regimental commander. He reviews and coordinates all instructions that are to be published to the command. He makes a continuous study of the medico-military situation with a view to being prepared for future contingencies.

When the commander is absent he directs all activities of the medical regiment as and for the commander in accordance with his policies. He meets all unforeseen situations as they arise without waiting for orders from the regimental commander; the latter is promptly notified of the action taken. In the usual case he remains at the command post of the medical regiment in the absence of the commander and directs the operations of the regiment.

The adjutant (S-1). The adjutant performs the usual work of his office in the routine administration of the regiment. Among the more important duties of his office are:

- Handling all official correspondence, except that pertaining to combat orders and instructions.

- Maintenance of the office of records for headquarters.

- Handling all returns and records of personnel.

- Preparation and distribution of all general and special orders, except those pertaining to combat operations.

- Initiation of requisitions for replacements.

- Classification and assignment of all personnel joining the regiment.

- Preparation of reports on strength and casualties, and incidental reports and returns.

- Operation of the regimental message center.

- Operation of the postal service.

- Command of the band.

- Direction of educational, recreational, and welfare activities.

The plans and training officer (S-3). The plans and training officer is charged, in general, with those duties which relate to the operations and training of the regiment. Specifically, his duties include:

- Keeping informed of the location, activities, state of training, and operation of all elements of the regiment.

- The preparation for the commander of all data bearing on the operations or training of the regiment.

- The preparation for the commander of plans and drafts of orders for probable operations of the regiment, including those to meet prospective or emergency situations, such as the standing operating procedures.

- The preparation and issue to subordinate units of all approved plans, orders, instructions relative to the employment of the regiment in combat and relative to training. Written orders and messages are distributed through the message center.

- The preparation of situation maps, operation maps, reports, and the war diary.

The supervision of training under direction of the regimental commander.

The assistant plans and training officer assists the plans and training officer as necessary in the performance of his duties.

The supply officer (S-4). The supply officer is also commander of the headquarters and service company. As a staff officer of the regimental commander, he is responsible for the efficient functioning of the supply system in the medical regiment. His specific responsibilities include the following:

The procurement, transportation, storage, and issue of all supplies to the regiment and of medical supplies to all units within the division.

Accountability for all equipment and matériel in the medical regiment.

Preparation of plans for supply to meet all foreseen contingencies.

Recommending the utilization of transportation, and when necessary its procurement for the movement of supplies, equipment, and personnel.

Responsibility for the collection and salvage of discarded matériel.

Disbursement of funds for the maintenance of the regiment, excluding pay of troops and organization funds. He may be designated as agent finance officer for payment of the troops.

The chaplains. The chaplains perform the usual duties of their offices. (Training Manual 2250-5.)

The Headquarters and Service Company, Medical Regiment

Organization. The headquarters and service company is organized into the following sections. See Plate 2.

Company headquarters.

Regimental headquarters section.

General medical supply section.

Regimental motor repair section.

Functions. The headquarters and service company has the following basic functions:

The supply of the medical regiment.

The medical supply of the entire division served.

The furnishing of personnel for the operation of regimental headquarters.

The operation of a mess for the officers of the regimental headquarters when the latter officers are not messed with companies.

The movement and transportation of regimental headquarters.

The messing and administration of its own personnel and the personnel of the band when present.

Establishment and operation of the motor repair unit.

Personnel. The assignment of personnel to duties within the headquarters and service company is flexible. While normal duties are assigned in each section, the amount of necessary work required in each section varies widely from day to day and in each situation. Therefore, all personnel is employed by the company commander in such a manner as to execute best the functions required of the company, due consideration being given to the training and duty requirements of the headquarters section. The personnel of the regimental headquarters section, while at all times under the administrative and disciplinary control of the headquarters and service company commander, is always at the disposition of its headquarters for assigned duties. It is a function of the headquarters and service company commander to insure that the personnel is given suitable basic training, is properly cared for and equipped, and is always available for its proper duties.

Company commander. The company commander commands the company and is responsible for its organization, training, supply, discipline, and operation.

He is regimental supply officer and as such is a staff officer of the regimental commander.

He is division medical supply officer and as such is an assistant to the division surgeon.

In this combined capacity of company commander and general and medical supply officer, he directs and coordinates the activities of subordinate officers, his enlisted personnel and the company equipment and transportation in such a manner as best to execute the functions of the company.

	1	2	3	4	5	6	7	8	9	10	11														
1	Unit	Specialists' ratings (class)	Regimental head- quarters *	Company head- quarters	Regimental head- quarters section b	General medical supply section	Regimental motor repair section	Total company	Aggregate	Enlisted cadre	Remarks														
2	Colonel.....		1						1		- Regimental head- quarters consists of— 1 colonel, commanding, and division surgeon; 1 lieutenant colonel, executive officer; 1 major, plans and training officer; 1 captain, adjutant; 1 lieutenant, assistant plans and training.														
3	Lieutenant colonel.....		1						1																
4	Major.....		1						1																
5	Captain.....		(a)2	1		* 2	* 1	3	3																
6	Lieutenant.....																								
7	Total commissioned.....		5	1		2	1	4	9		* For duty with regimental headquarters. * Medical Administrative Corps.														
8	Master sergeant, including.....				1	1	1	3	3	3															
9	Regimental motor sergeant (068).....						(1)	(1)	(1)																
10	Regimental sergeant major (052).....				(1)			(1)		(1)															
11	Regimental supply sergeant (186).....					(1)		(1)		(1)															
12	Technical sergeant, including.....			1	1	1		3	3	3	Summary of specialists' ratings														
13	First sergeant (585).....			(1)				(1)		(1)															
14	Medical supply sergeant (186).....				(1)			(1)		(1)															
15	Personnel sergeant major (052).....					(1)		(1)		(1)															
16	Staff sergeant, including.....				1			1	1	1															
17	Chief clerk (052).....				(1)			(1)		(1)	<table><tr><th>Class</th><th>Number</th></tr><tr><td>2d.....</td><td>1</td></tr><tr><td>3d.....</td><td>4</td></tr><tr><td>4th.....</td><td>6</td></tr><tr><td>5th.....</td><td>10</td></tr><tr><td>6th.....</td><td>7</td></tr><tr><td>Total.....</td><td>28</td></tr></table>	Class	Number	2d.....	1	3d.....	4	4th.....	6	5th.....	10	6th.....	7	Total.....	28
Class	Number																								
2d.....	1																								
3d.....	4																								
4th.....	6																								
5th.....	10																								
6th.....	7																								
Total.....	28																								
18	Sergeant, including.....			3	1			4	4	1															
19	Mess (124).....			(1)				(1)		(1)															
20	Motor (068).....			(1)				(1)		(1)															
21	Plans and training (052).....				(1)			(1)		(1)															
22	Supply (186).....			(1)				(1)		(1)	The serial number symbol shown in parentheses is an inseparable part of the specialist designation. A number below 500 refers to an occupational specialist whose qualification analysis is found in section I, AR 615-26. A number above 500 refers to a military occupational specialist listed in section II, AR 615-26.														
23	Corporal, including.....			1	1			2	2	1															
24	Chaplain's assistant (534).....				(1)			(1)		(1)															
25	Company clerk (055).....			(1)						(1)															
26	Private, first class.....							13	13																
27	Private.....			12	11	7	9	26	26	2	The serial number symbol shown in parentheses is an inseparable part of the specialist designation. A number below 500 refers to an occupational specialist whose qualification analysis is found in section I, AR 615-26. A number above 500 refers to a military occupational specialist listed in section II, AR 615-26.														
28	Bugler (021).....			(1)				(1)		(1)															
29	Chauffeur (245).....	5th		(1)	(1)	(2)		(4)																	
30	Chauffeur (245).....	6th		(2)		(3)		(5)																	
31	Clerk, general (055).....	5th		(1)	(2)			(3)																	
32	Cook (060).....	3d		(1)				(1)		(1)	The serial number symbol shown in parentheses is an inseparable part of the specialist designation. A number below 500 refers to an occupational specialist whose qualification analysis is found in section I, AR 615-26. A number above 500 refers to a military occupational specialist listed in section II, AR 615-26.														
33	Cook (060).....	4th		(1)				(1)		(1)															
34	Cook's helper (521).....			(1)				(1)		(1)															
35	Mechanic, automobile (014).....	2d					(1)	(1)		(1)															
36	Mechanic, automobile (014).....	3d					(2)	(2)		(1)															
37	Mechanic, automobile (014).....	4th		(1)			(4)	(5)			The serial number symbol shown in parentheses is an inseparable part of the specialist designation. A number below 500 refers to an occupational specialist whose qualification analysis is found in section I, AR 615-26. A number above 500 refers to a military occupational specialist listed in section II, AR 615-26.														
38	Mechanic, general (121).....	5th		(1)				(1)		(1)															
39	Motorcyclist (678).....	5th			(1)	(1)		(2)																	
40	Private—Continued.....																								
41	Motorcyclist (678).....	6th			(1)		(1)	(2)																	
42	Orderly (695).....			(1)	(3)			(4)			The serial number symbol shown in parentheses is an inseparable part of the specialist designation. A number below 500 refers to an occupational specialist whose qualification analysis is found in section I, AR 615-26. A number above 500 refers to a military occupational specialist listed in section II, AR 615-26.														
43	Stenographer (213).....	3d			(1)			(1)																	
44	Basic (521).....			(1)	(2)	(1)	(1)	(5)																	
45	Total enlisted.....			17	16	9	10	52	52	11															
46	Aggregate.....			5	18	16	11	56	61	11															
47	Q Car, light, 5-passenger, sedan.....				1			1	1		The serial number symbol shown in parentheses is an inseparable part of the specialist designation. A number below 500 refers to an occupational specialist whose qualification analysis is found in section I, AR 615-26. A number above 500 refers to a military occupational specialist listed in section II, AR 615-26.														
48	Q Motorcycle, solo.....				1			1	1																
49	Q Motorcycle, with side car.....				1	1	1	3	3																
50	Q Trailer, tank, water, 250-gallon.....			1				1	1																
51	Q Trailer, 1-ton, cargo.....			1				1	1																
52	Q Truck, 1½-ton, command.....			1				1	1		The serial number symbol shown in parentheses is an inseparable part of the specialist designation. A number below 500 refers to an occupational specialist whose qualification analysis is found in section I, AR 615-26. A number above 500 refers to a military occupational specialist listed in section II, AR 615-26.														
53	Q Truck, 1½-ton, pick-up.....			1			1	2	2																
54	Q Truck, 1½-ton, cargo.....			1				1	1																
55	Q Truck, 2½-ton, cargo.....			1		4		5	5																
56	Q Truck, 2½-ton, cargo, with winch.....						2	2	2																

Plate 2. T/O 8-22. Organization of the Headquarters and Service Company Medical Regiment.

Company headquarters. The personnel of the company headquarters performs the following duties:

Administration and supply of the company.

Operation of a mess for officers of regimental headquarters and, when necessary, for those of battalion headquarters.

Operation of all transportation in the company.

Transports officers' baggage and headquarters equipment of regimental headquarters.

Regimental headquarters section. The personnel of the regimental headquarters section establishes and operates, under the assigned officers, the headquarters of the regiment. This section handles:

All regimental administrative matters.

All personnel work and correspondence for the regiment.

Mail for the regiment.

Orders pertaining to field operations.

The regimental message center.

General medical supply section. The personnel of the general medical supply section:

Ascertains the needs of the regiment for general supplies, and of all units in the division for medical supplies, by personal contact with the personnel and by anticipating future needs.

Under direction of the supply officer, receives, checks, consolidates, and forwards requisitions.

Receives, checks, transports, and sorts supplies.

Issues supplies as required.

Regimental motor repair section. The personnel of the motor repair section establishes and operates a motor repair shop for the maintenance of all the vehicles with the medical regiment.

Transportation. The transportation of the headquarters and service company consists of:

1 car, light, 5-passenger sedan.

1 motorcycle, solo

3 motorcycles with side car

1 trailer, 1-ton, cargo

1 trailer, tank, water, 250-gallon

1 truck, ½-ton, command

2 trucks, ½-ton, pick-up

1 truck, 1½-ton, cargo

5 trucks, 2½-ton, cargo

2 trucks, 2½-ton, cargo, with winch

The 1st Battalion (Collecting), Medical Regiment

Organization. The 1st battalion (Collecting) of the medical regiment consists of 17 officers and 381 enlisted men. It is divided functionally into:

Battalion headquarters and headquarters detachment.

Three collecting companies, identical in organization, transportation, and equipment.

Functions. This battalion establishes and operates the collecting stations during combat. The battalion proceeds to the place designated in the regimental order from which it sends forward one or more of its companies to the locations designated in the regimental order for the collecting stations.

Personnel. The distribution of personnel of the 1st Battalion (Collecting) is shown in Plate 3. The personnel consists of 1 lieutenant colonel, 3 captains, 13 lieutenants (1 may be medical administrative corps officer), 3 technical sergeants, 10 staff sergeants, 19 sergeants, 18 corporals, 110 privates first class, and 221 privates.

Battalion Headquarters and Headquarters Detachment. The headquarters of the collecting battalion and headquarters detachment consists of the battalion commander, the adjutant, 1 staff sergeant, 1 sergeant, 4 privates first class or privates.

Battalion commander. The battalion commander decides how individual companies are to be used in the execution of an assigned mission and supervises their movements to position. He directs and supervises the activities of the companies and coordinates their efforts. He maintains close personal touch with the situation in his battalion and keeps the regimental commander informed of changes. He prepares and keeps up-to-date plans to meet possible changes in the situation and makes recommendations to the regimental

1	2	3	4	5	6	7	8	9	10	11
Unit	Specialists' ratings (class)	Battalion headquarters and headquarters detachment	Medical company, collecting							Remarks
			Company headquarters	Station section	Liaison section	2 litter bearer platoons	Total company	Total battalion (battalion headquarters and headquarters detachment and 3 collecting companies)	Enlisted cadre	
2 Lieutenant colonel.....		1						1		
3 Captain.....			1				1	3		
4 Lieutenant.....		1	2		2	4	13			
5 Total commissioned.....		2	1	2		2	5	17		* Medical Administrative Corps.
6 Technical sergeant including.....			1				1	3		Summary of specialists' ratings
7 First sergeant (585).....			(1)				(1)	(3)	(3)	
8 Staff sergeant, including.....		1	1		2	3	10	1		
9 Battalion sergeant major (052).....		(1)					3	(1)	(1)	
10 Platoon (651).....			(1)				(2)	(3)	(9)	
11 Sergeant, including.....		1	2	1	1	2	6	19	6	Class
12 Assistant platoon leader (651).....			(1)		(2)	(3)	(9)			
13 Liaison (503).....					(1)		(1)	(3)		Com-pany
14 Mess (124).....			(1)				(1)	(3)	(3)	
15 Supply (186).....		(1)	(1)				(1)	(4)	(3)	Battal-ion
16 Corporal, including.....			2		4	6	18	3		
17 Company clerk (055).....			(1)				(1)	(3)	(3)	3d..... 4 12
18 Motor (068).....			(1)				(1)	(3)		4th..... 12 36
19 Section leader (652).....					(4)	(4)	(12)			5th..... 20 63
20 Private, first class.....		4	18	13	6	72	36	110		6th..... 41 123
21 Private.....							73	221	24	Total..... 77 234
22 Bugler (021).....			(1)				(1)	(3)		The serial number symbol shown in parentheses is an inseparable part of the specialist designation. A number below 500 refers to an occupational specialist whose qualification analysis is found in section I, AR 615-26. A number above 500 refers to a military occupational specialist listed in section II, AR 615-26.
23 Chauffeur (245).....	5th	(1)	(2)	(1)			(3)	(10)		
24 Chauffeur (245).....	6th		(2)	(1)			(3)	(9)		
25 Clerk, general (055).....	5th	(1)	(1)				(1)	(4)		
26 Cook (060).....	3d		(2)				(2)	(6)	(3)	
27 Cook (060).....	4th		(1)				(1)	(3)		
28 Cook's helper (521).....			(2)				(2)	(6)		
29 Litter bearer.....	6th					(20)	(20)	(60)		
30 Litter bearer.....						(20)	(20)	(60)		
31 Mechanic, automobile (014).....	4th		(1)				(1)	(3)		
32 Mechanic, general (121).....	5th		(1)				(1)	(3)		
33 Motorcyclist (678).....	5th	(1)	(1)				(1)	(4)		
34 Motorcyclist (678).....	6th		(1)				(1)	(3)		
35 Orderly (695).....		(1)	(1)				(1)	(4)		
36 Technician, medical (123).....	4th			(1)		(2)	(3)	(9)	(3)	
37 Technician, medical (123).....	5th					(4)	(4)	(12)	(3)	
38 Technician, sanitary (196).....	4th			(1)	(1)	(2)	(4)	(12)	(3)	
39 Technician, sanitary (196).....	5th				(2)	(1)	(6)	(18)	(3)	
40 Technician, sanitary (196).....	6th				(3)	(6)	(9)	(27)		
41 Technician, surgical (225).....	3d			(2)			(2)	(6)	(3)	
42 Technician, surgical (225).....	4th			(3)			(3)	(9)	(3)	
43 Technician, surgical (225).....	5th			(2)		(2)	(4)	(12)	(3)	
44 Technician, surgical (225).....	6th				(8)	(8)	(24)			
45 Basic (521).....			(2)	(2)		(4)	(8)	(24)		
46 Total enlisted.....		6	23	15	7	80	125	381	37	
47 Aggregate.....		8	24	17	7	82	130	398	37	
48 Q Motorcycle, solo.....		1	1				1	4		
49 Q Motorcycle, with side car.....			1				1	3		
50 Q Trailer, tank, water, 250-gallon.....			1				1	3		
51 Q Trailer, 1-ton, cargo.....			1				1	3		
52 Q Truck, ½-ton, command.....		1	1				1	4		
53 Q Q Truck, ½-ton, pick-up.....			1				1	3		
54 Q Q Truck, ½-ton, cargo.....			3				3	9		
55 Q Q Truck, ½-ton, cargo, with winch.....			1				1	3		

Plate 3. T/O 8-25. Organization of the 1st Battalion (Collecting), Medical Regiment.

commander at appropriate times. When sudden or unexpected changes in the tactical situation demand immediate action, he makes decision himself and notifies the regimental commander at once of any action taken. He works in close association with the commanders of other medical battalions with which his battalion is operating.

Transportation. The transportation of the battalion headquarters consists of:

1 motorcycle, solo.

1 truck, 1½-ton, command.

The Collecting Company. There are three collecting companies in the war strength collecting battalion. They are designated as Company A, Company B, and Company C, respectively.

Organization. The collecting company is organized into a company headquarters, a station section, a liaison section, and two litter-bearer platoons. (See Plate 3.)

Functions. The collecting company has the following functions:

During and after combat, the movement by litter-carry of casualties to a collecting station from regimental and battalion aid stations, and from the field when for any reason this is necessary, and their sorting, temporary treatment, and preparation for evacuation by ambulance to a clearing station. Only emergency treatment is given at the collecting station.

Establishment and operation of march collecting posts during troop movements.

Attachment of a collecting company or detachment thereof to security detachments such as advance, flank, and rear guards.

Sanitary functions.

Command. The collecting company is an integral part of the collecting battalion, and its technical or tactical employment rests, therefore, with the battalion commander, subject to the orders of the regimental commander.

When any part of a collecting company is attached for duty to a security detachment, or to a detached force, the command thereof passes to the commander of the security detachment or detached force. A detachment of the medical regiment composed of two or more units is commanded by the senior officer present with the detachment.

Litter-bearer elements of the collecting company engaged in clearing casualties from a regimental or battalion area normally function under their own commanding officer, but where special conditions make it advisable litter bearers from a collecting company, by specific authority of the division surgeon, may be placed temporarily under the immediate command of the surgeon in whose area they are operating.

Company headquarters. Company headquarters consists of such commissioned and enlisted personnel as required for the command, administration, and supply of the company as a whole.

Company headquarters maintains at all times a small office for the administration and supply of the company, including the preparation of reports, returns, requisitions, and correspondence. The normal duty assignments of headquarters personnel are shown in Plate 3. The company commander may detail his officers for additional company duties, as follows:

Supply officer, who is responsible for the procurement, storage, and distribution of all supplies and equipment.

Mess officer, who is responsible for the procurement of rations and the operation of the company mess.

Transportation officer, who is responsible for the maintenance of the motor transport.

The personnel of company headquarters consists of 1 officer and 23 enlisted men.

The transportation of company headquarters consists of:

1 motorcycle, solo

3 trucks, 1½-ton, cargo

1 motorcycle, with side car

1 truck, ½-ton, command

1 trailer, tank, water, 250 gallon

1 truck, 1½-ton, cargo, with winch

1 trailer, 1-ton, cargo

1 truck, ½-ton, pick-up

The collecting station section is charged with the establishment and operation of the collecting station for the reception, sorting, emergency treatment, feeding, and prepara-

tion of the sick, gassed, and wounded for evacuation to a clearing station. When at the station this section is reinforced as necessary from company headquarters.

The *liaison section* is charged with the establishment and maintenance of communications (contact) with the regimental medical detachments attached to combat units in the area of operation covered by the collecting company.

Litter-bearer platoons. The litter-bearer platoons are identical in function and organization. They carry litter cases to the collecting station from the aid stations and when necessary, from the field in rear of the battalion aid stations, in their area of operation. They operate the company's wheeled-litter-carriers whenever their use is practicable. They perform such first aid for casualties handled by them as may be necessary. Each platoon is commanded by an officer. In combat, however, one of these platoon leaders is normally assigned to duty at the collecting station; the remaining officer commands both platoons.

Equipment and supply. The equipment for a collecting company is prescribed in Tables of Basic Allowances and in Tables of Equipment.

The *collecting station equipment and matériel* include light hospital tents, drugs, surgical instruments, simple sterilizing apparatus, blankets, litters, wheeled litter carriers, and other supplies sufficient to treat approximately 600 mixed battle casualties, without replacement other than the routine blanket, litter, and splint exchange effected by the ambulance company evacuating the collecting station.

The *transportation* of the collecting company consists of:

3 trucks, 1½-ton, cargo	1 trailer, water tank, 250-gallon
1 truck, ½-ton, pick-up	1 trailer, 1-ton, cargo
1 truck, ½-ton, command	1 motorcycle, with side car
1 truck, 1½-ton, cargo, with winch	1 motorcycle, solo

Class I, II, III and IV supplies (less medical supplies) are obtained by formal or informal requisition on the regimental supply officer. Class I supplies are normally delivered to bivouac areas or collecting stations by the headquarters and service company.

Medical supplies are obtained by formal or informal requisition on the division medical supply officer. Except during combat they are normally drawn by company personnel and transport at the division medical distributing point. During combat they are obtained by informal requisition on the headquarters and service company or at dumps established in the vicinity of the collecting station.

The 2d Battalion (Ambulance), Medical Regiment

Organization. The 2d battalion (ambulance) of the medical regiment consists of 11 officers and 213 enlisted men. It is divided for functional purposes into (see Plate 4):

A battalion headquarters.

3 ambulance companies, identical in organization, transportation, and equipment.

Functions. This battalion evacuates by motor ambulance the collecting stations and the aid stations which are established in rear of the collecting stations. It also transports the foot elements of the collecting battalion when so ordered. The battalion proceeds to the place designated in the regimental order from which it sends forward one or more of its companies to the locations prescribed to execute its mission. They are used in a similar manner within the corps and army areas when integral parts of such organizations.

Personnel. The personnel strength of the 2d battalion (ambulance) and its distribution is indicated in Plate 4. The personnel consists of: 1 lieutenant colonel, 3 captains, 7 lieutenants (may be medical administrative corps officers), 3 technical sergeants, 10 staff sergeants, 13 sergeants, 9 corporals, 65 privates first class, and 113 privates.

Battalion Headquarters. The headquarters of the ambulance battalion is composed of the battalion commander, the adjutant, 1 staff sergeant (battalion sergeant major), 1 sergeant, and 4 privates first class or privates.

Battalion commander. The battalion commander decides the method of employment of individual companies in the execution of an assigned mission and supervises their operation. He directs and supervises the activities of the companies and coordinates their efforts. He designates the active company or companies, prescribes the general loca-

tion of the ambulance stations, the time and route of movement thereto, and the transporting of collecting battalion personnel when necessary. He assigns each ambulance company a mission of evacuating specified collecting stations or aid stations within a particular area. He prescribes routes to the clearing station in accordance with the divi-

1	2	3	4	5	6	7	8	9	10
Unit	Specialists' ratings (class)	Battalion headquarters	Medical company, ambulance				Total (battalion headquarters and 3 ambulance companies)	Enlisted cadre	Remarks
		Company headquarters	1st platoon	2d platoon	Total company				
Lieutenant colonel.....		1				1	1		
Captain.....		1				1	1		
Lieutenant.....		1	1	1	2	2	2		
Total commissioned.....		2	1	1	1	3	11		
Technical sergeant, including.....		1				1	3		• Medical Administrative Corps.
First sergeant (585).....		(1)				(1)	(3)		
Staff sergeant, including.....		1	1	1	1	3	10		Summary of specialists' ratings
Battalion sergeant major (052).....		(1)				(1)	(1)		
Motor (068).....		(1)				(1)	(3)		
Platoon (651).....			(1)	(1)	(2)	(6)			
Sergeant, including.....		1	2	1	1	4	13		
Mass (124).....		(1)				(1)	(3)		
Section leader (652).....		(1)	(1)	(1)	(2)	(6)			
Supply (186).....		(1)	(1)		(1)	(4)			
Corporal, including.....		1	1	1	1	3	9		
Assistant section leader (652).....			(1)	(1)	(2)	(6)			
Company clerk (055).....			(1)		(1)	(3)			
Private, first class.....		4	12	23	23	37	113		
Private.....			(10)	(10)	(20)	(69)			
Ambulance orderly (696).....		5th	(1)	(2)	(5)	(12)	(37)		
Chauffeur (245).....		6th	(2)	(5)	(5)	(12)	(37)		
Chauffeur (245).....		5th	(1)						
Clerk, general (055).....		3d							
Cook (060).....		4th							
Cook (060).....			(1)			(1)	(3)		
Cook's helper (521).....			(1)			(1)	(3)		
Mechanic, automobile (014).....		3d		(1)		(1)	(3)		
Mechanic, automobile (014).....		4th				(1)	(3)		
Mechanic, general (121).....		5th		(1)		(1)	(3)		
Motorcyclist (678).....		6th	(1)			(1)	(4)		
Orderly (695).....			(1)			(1)	(4)		
Basic (521).....				(3)	(3)	(6)	(18)		
Total enlisted.....		6	17	26	26	69	213		
Aggregate.....		8	18	27	27	72	224		
Q Ambulance, field, cross country.....				10	10	20	60		
Q Motorcycle, solo.....		1				1	1		
Q Motorcycle, with side car.....			1			1	3		
Q Trailer, 1-ton, cargo.....			1			1	3		
Q Trailer, tank, water, 250-gallon.....			1			1	3		
Q Truck, 1½-ton, command.....		1	1			1	4		
Q Truck, 1½-ton, pick-up.....			1			1	3		
Q Truck, 1½-ton, cargo.....			1			1	3		
Q Truck, 1½-ton, winch equipped.....			1			1	3		

Plate 4. T/O 8-35. Organization of the 2d Battalion (Ambulance), Medical Regiment.

sion traffic plan. He designates the reserve company, if any, its position, and route to the reserve area. Thereafter, he coordinates and controls the operations of the companies in accordance with the changing situation. He must work in close association with the commanders of other medical battalions with which his battalion is operating.

The Ambulance Company. There are three motorized ambulance companies in the ambulance battalion. They are designated as Company D, Company E, and Company F, respectively.

Organization. The ambulance company is organized into a company headquarters and two platoons. (See Plate 5.)

Functions. The principal functions of the ambulance company are:

The transportation of casualties from collecting stations.

When practicable, the transportation of casualties from regimental aid stations, battalion aid stations, or other advanced loading posts to the clearing station.

The movement of non-transportable cases to the surgical hospital when the latter is located in the vicinity of the clearing station.

The transmission of messages along ambulance routes.

The transportation of medical personnel and supplies forward to medical installations being evacuated.

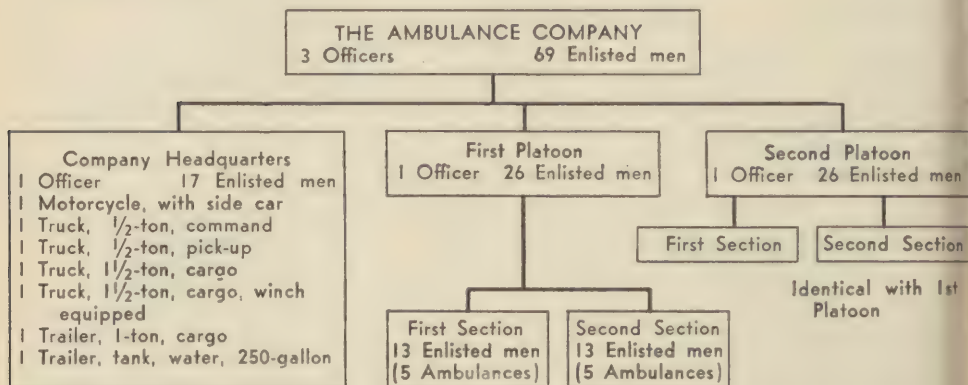


Plate 5. Suggested Functional Organization of the Ambulance (Motor) Company, Medical Regiment.

Command. The ambulance company is an integral part of the ambulance battalion. Its employment rests with the battalion commander, subject to the orders of the regimental commander.

When an ambulance company or a detachment thereof is attached to an advance, flank, or rear guard or to a detached force, the command thereof while so attached passes to the commander of the security detachment or detached force.

Company headquarters. Company headquarters consists of such commissioned and enlisted personnel as is required for the command, administration, and supply of the company as a whole. The normal duty assignments of headquarters personnel are shown in Plate 4.

Platoons. Both platoons of the ambulance company are identical in organization, equipment, and transportation. Each platoon consists of a platoon headquarters and 2 sections.

Each platoon headquarters consists of 1 officer who is the platoon leader and 1 staff sergeant who is the platoon sergeant.

Each *ambulance section* (2) consists of a sergeant who is the section leader and 12 privates first class or privates. The section is the basic operating unit and operates 5 motor ambulances.

Equipment and supply. The equipment for an ambulance company is prescribed by Tables of Basic Allowances and by Tables of Equipment.

Supplies are obtained by formal or informal requisition on the regimental supply officer and are drawn by company personnel and transport at the regimental distributing point for such supplies, or they are delivered to the ambulance station by the headquarters and service company of the medical regiment.

The *transportation* of the ambulance company consists of:

1 truck, ½-ton, command	1 trailer, 1-ton, cargo
1 truck, ½-ton, pick-up	1 trailer, tank, water, 250-gallon
1 truck, 1½-ton, cargo	1 motorcycle, with side car
1 truck, 1½-ton cargo, with winch	20 ambulances, field, cross-country (five ambulances per section)

The 3d Battalion (Clearing), Medical Regiment

Organization. The 3d battalion (clearing) of the medical regiment consists of 29 officers and 306 enlisted men. It is organized to provide temporary care and treatment of casualties with the minimum of personnel and equipment without sacrificing mobility. In this organization, provisions are made for expansion and cooperative action with other medical installations. The clearing battalion (formerly known as the hospital battalion) is divided for functional purposes into:

Battalion headquarters and headquarters detachment.

Three clearing companies, identical in organization, transportation, and equipment.

This battalion establishes and operates the clearing stations during combat and at such other times as clearing stations are required. The battalion proceeds to the place designated in the regimental order where one or more of its companies establish the clearing station or stations required.

Personnel. The personnel strength of the 3d battalion (clearing) and its distribution are indicated in Plate 6. The personnel consists of: 1 lieutenant colonel, 12 captains, 16 lieutenants (6 of whom are dental officers, and 1 may be medical administrative corps officer), 3 technical sergeants, 7 staff sergeants, 31 sergeants, 15 corporals, 83 privates first class, and 167 privates.

Battalion Headquarters and Headquarters Detachment. The headquarters of the clearing battalion and headquarters detachment consists of the battalion commander, the adjutant, 1 staff sergeant, and 4 privates first class or privates.

Battalion commander. The battalion commander, in compliance with instructions contained in the regimental field order, prescribes the time and route of movement of the clearing companies to the prospective location of the clearing station and supervises the movement of the companies to the sites. He designates the company or companies to establish the clearing station or stations, selects the particular site or sites for them, designates the amount of shelter to erect or utilize, and supervises the functioning of the clearing station, when two or more companies are functioning together. He designates the company or companies to be held in reserve, if any, and their position. He may assign tasks to reserve companies in rendering any assistance necessary to the active companies or preliminary preparation of their own prospective sites for later establishment.

The Clearing Company. There are three clearing companies in the clearing battalion. They are designated as Company G, Company H, and Company I, respectively.

Organization. The clearing company is organized to provide temporary care and treatment of casualties from the division, preparing them for further evacuation so they can be cleared from the division. A competent coordinating head and the division of the company into essential groups and departments with responsible chiefs and adequately trained personnel are of prime importance. The salient requirements are:

Systematic methods which guarantee speed and precision in:

Packing and unpacking of equipment and supplies.

Loading and unloading of transport.

Erection and striking of tentage.

Installation of equipment.

Provisions for expansion and cooperative action with other clearing companies.

An orderly plan for admitting, feeding, and recording patients and of sorting them for operation, treatment, and evacuation.

The apportionment of personnel shown in Plate 6 is based on the duties which must be performed in order that the unit may perform its combat functions. Flexibility within

	1	2	3	4	5	6	7	8	9	10
	Unit	Specialists' ratings (class)	Battalion headquarters and headquarters detachment	Medical company, clearing			Total battalion headquarters and headquarters detachment and 3 companies	Enlisted cadre	Remarks	
			Company headquarters	Station platoon	Transportation platoon	Total company				
2	Lieutenant colonel.....		1				1			
7	Captain.....		1	3		4	12			
3	Lieutenant.....		1	(42) 4	1	5	16			
4										
5	Total commissioned.....		2	1	7	1	9	29		
6	Technical sergeant, including.....		1			1	3	3		
7	First sergeant (585).....		(1)			(1)	(3)	(3)		
8	Staff sergeant, including.....		1		2	2	7	1		
9	Battalion sergeant major (052).....		(1)				(1)	(1)		
10	Platoon (651).....				(2)	(2)	(6)			
11	Sergeant, including.....		1	2	7	1	10	31	6	
12	Clerk, headquarters (055).....			(^b 1)		(1)	(3)			
13	Mess (124).....			(1)		(1)	(3)	(3)		
14	Motor (068).....				(1)	(1)	(3)			
15	Section leader (652).....			(^c 6)		(6)	(18)			
16	Supply (186).....		(1)	(1)		(1)	(4)	(3)		
17	Corporal, including.....			1	4	5	15	3		
18	Assistant section leader (652).....				(4)	(4)	(12)			
19	Company clerk (055).....			(1)		(1)	(3)	(3)		
20	Private, first class, including.....		4	14	52	16	27	83		
21	Private.....						55	167	30	
22	Bugler (021).....			(1)		(1)	(3)			
23	Chaufeur (245).....	5th	(1)			(5)	(5)	(16)		
24	Chaufeur (245).....	6th				(6)	(6)	(18)		
25	Clerk, general (055).....	5th	(1)		(1)	(1)	(4)			
26	Cook (060).....	3d	(2)			(2)	(6)	(3)		
27	Cook (060).....	4th	(3)			(3)	(9)			
28	Cook's helper (521).....		(5)			(5)	(15)			
29	Mechanic, automobile (014).....	3d				(1)	(1)	(3)		
30	Mechanic, general (121).....	5th	(1)			(1)	(1)	(3)		
31	Motorcyclist (678).....	6th	(1)			(1)	(1)	(4)		
32	Orderly (665).....		(1)	(2)		(2)	(7)			
33	Pharmacist (149).....	3d			(2)	(2)	(6)	(3)		
34	Technician, dental (067).....	4th				(2)	(6)	(3)		
35	Technician, medical (123).....	4th			(2)	(2)	(6)	(3)		
36	Technician, medical (123).....	5th			(5)	(5)	(15)	(3)		
37	Technician, medical (123).....	6th			(7)	(7)	(21)			
38	Technician, sanitary (197).....	5th			(1)	(1)	(3)	(3)		
39	Technician, surgical (225).....	3d			(1)	(1)	(3)	(3)		
40	Technician, surgical (225).....	4th			(2)	(2)	(6)	(3)		
41	Technician, surgical (225).....	5th			(2)	(2)	(6)	(3)		
42	Technician, surgical (225).....	6th			(3)	(3)	(9)	(3)		
43	Ward attendant, medical.....				(9)	(9)	(27)			
44	Ward attendant, surgical.....				(9)	(9)	(27)			
45	Basic (521).....				(6)	(3)	(9)	(27)		
46	Total enlisted.....		6	18	65	17	100	306	43	
47	Aggregate.....		8	19	72	18	109	335	43	
48	Motorcycle, solo.....		1				1			
49	Motorcycle, with side car.....					1	1	3		
50	Trailer, tank, water, 250-gallon.....					2	2	6		
51	Trailer, 1-ton, cargo.....					6	6	18		
52	Truck, 1/2-ton, command.....		1			2	2	7		
53	Truck, 1/2-ton, pick-up.....					1	1	3		
54	Truck, 2 1/2-ton, cargo.....					7	7	21		
55	Truck, 2 1/2-ton, cargo, with winch.....					1	1	3		

* Medical Administrative Corps.
^b In charge hospital records.
^c In charge of—Admission tent, surgical tent, shock tent, bath tent.
^d Dental.

Summary of specialists' ratings

Class	Company	Battalion
3d.....	6	18
4th.....	9	27
5th.....	15	47
6th.....	17	52
Total.....	47	144

The serial number symbol shown in parentheses is an inseparable part of the specialist designation. A number below 500 refers to an occupational specialist whose qualification analysis is found in section I, AR 615-26. A number above 500 refers to a military occupational specialist listed in section II, AR 615-26.

Plate 6. T/O 8-45. Organization of the 3d Battalion (Clearing), Medical Regiment.

the organization is necessary and demands the shifting of personnel from one duty to another as circumstances require. It is a function of the commander to train personnel by temporary interchange in departments so that emergencies can be met successfully without undue embarrassment.

Functions. The clearing company exists primarily for the sorting and temporary care of battle casualties in the combat area and operates as a clearing station for sick and wounded requiring evacuation from the area served by the company during combat. The clearing station established forms the rearmost echelon of the divisional medical service. In temporary camps and march bivouacs it may furnish temporary hospitalization for the care of the sick. Its operation is based on the principle that casualties shall be evacuated from the combat area to the rear as safely, rapidly, and continuously as human agencies will permit. Being essentially a mobile unit operating with combat forces, it has neither the personnel nor equipment necessary to provide definitive or prolonged treatment for serious cases. Its functions may include treatment of special cases—surgical, medical, or gassed.

Command. The clearing company is an integral part of the clearing battalion. Its technical or tactical employment rests, therefore, with the battalion commander. Close cooperation with ambulance companies and with units evacuating the clearing station is essential if efficient operation of the evacuation system is to be obtained.

Company headquarters. Company headquarters consists of such commissioned and enlisted personnel as is required for the command, administration, and supply of the company as a whole.

Company headquarters is operated in Tent No. 1 of the clearing station when it is in operation. It normally consists of 1 officer and 18 enlisted men (See Plate 6): 1 captain, 1 technical sergeant, 2 sergeants, 1 corporal, and 14 privates first class or privates.

The station platoon. The station platoon consists of 5 medical officers (3 captains, 2 first lieutenants), 2 dental officers (first lieutenants), 2 staff sergeants, 7 sergeants, 4 corporals, and 52 privates first class or privates. A sergeant is in charge of the station records, and there is a sergeant who is in charge for each of the following tents: admission tent, surgical tent, shock tent, and bath tent. The enlisted men are technically trained personnel for service throughout the clearing station (see Plate 6) and include: clerks; pharmacists; dental, medical, sanitary, and surgical technicians; and attendants. All of these men are valuable technical assistants to the medical and dental officers.

The transportation platoon. The transportation platoon consists of 1 officer (lieutenant), 1 sergeant, and 16 privates first class or privates. This platoon is charged with handling and maintaining motor transportation for the company personnel and equipment. The sergeant is the motor sergeant. The remaining enlisted men are automobile mechanics, chauffeurs, motorcyclist, and basic privates.

Transportation and equipment. The transportation of the clearing company consists of:

7 trucks, 2½-ton, cargo	6 trailers, 1-ton, cargo
1 truck, 2½-ton, cargo, with winch	2 trailers, tank, water, 250-gallon
2 trucks, ½-ton, command	1 motorcycle, with side car
1 truck, ½-ton, pick-up	

The equipment for a clearing company is prescribed by Tables of Allowances and by Tables of Equipment. It is equipped to care for 250 patients. To insure mobility, many articles deemed necessary for fixed hospitals are of necessity eliminated. Although designed for the care and treatment of all classes of casualties, particular provisions are made for the needs of emergency surgical cases. All equipment is packed in standard containers and consists, basically, of multiples of standard Medical Department field equipment, plus miscellaneous supplies.

The equipment for the clearing station must be loaded on the transportation in a manner that will permit a rapid establishment of the clearing station, particularly of those departments that function in all tactical situations. In so far as practicable, the complete equipment and supplies for each tent of the basic unit should be carried on the same truck.

Functional or operating organization (basic unit). The functional or operating organization of the clearing company is discussed later in this chapter under Employment of the Clearing Company.

THE MEDICAL SQUADRON FOR CAVALRY DIVISIONS

Organization. The medical squadron is an organic part of the cavalry division. (See Plate 7.) It consists of:

Squadron headquarters.

Headquarters detachment.

A collecting troop.

A clearing troop.

The veterinary troop.

Personnel. Exclusive of the Division Surgeon's Office personnel there are within the medical squadron 24 officers and 326 enlisted men, a total strength of 350. According to rank and grade, they are as follows:

17 *medical officers*: 1 lieutenant colonel (Division Surgeon and commanding officer of the medical squadron), 1 major, 3 captains (1 may be medical administrative corps officer), 12 lieutenants (2 may be medical administrative corps officers).

2 *dental officers*: first lieutenants.

4 *veterinary officers*: 1 captain (commanding officer of the veterinary troop) and 3 first lieutenants.

1 *chaplain*: a captain.

328 *enlisted men*: 1 master sergeant (squadron sergeant major), 6 technical sergeants, 10 staff sergeants, 28 sergeants, 17 corporals, 90 privates first class, and 176 privates.

	1	2	3	4	5	6	7	8	9	10	11
1	Unit	Specif. Serial Number	Spec. Ratings (class)	Squadron Hqrs.	Hqrs. Det.	Coll. Troop	Clearing Troop	Vet. Troop	Total Squad	Enlisted Cadre	Division Surgeon's Office
2	Lieutenant colonel			1 ^b					1		1 ^b
3	Major			1 ^c					1		1 ^c
4	Captain			1 ^a	1 ^a	1	1	1 ^v	5		1 ^a
5	Lieutenant			1 ^a	1 ^a	6	6 ^{2d}	3 ^v	17		1 ^a
6	Total commissioned			4	2	7	7	4	24		4
7	Master sergeant				1				1	1	1
8	Squadron sergeant major	(052)			(1)				(1)	(1)	
9	Chief clerk	(052)									(1)
10	Technical sergeant				3	1	1	1	6	6	
11	First sergeant	(585)			(1)	(1)	(1)	(1)	(4)	(4)	
12	Squadron motor sergeant	(068)			(1)				(1)	(1)	
13	Squadron supply sergeant	(186)			(1)				(1)	(1)	
14	Staff sergeant				2	3	2	3	10	3	
15	Medical supply sergeant	(186)							(1)	(1)	
16	Personnel sergeant major	(052)			(1)				(1)	(1)	
17	Platoon sergeant	(651)				(2)	(2)	(3)	(7)		
18	Troop motor sergeant	(068)				(1)			(1)	(1)	
19	Sergeant				3	8	9	8	28	3	21 ^v
20	Mess	(124)			(1)	(1)	(1)	(1)	(4)	(1)	
21	Supply	(186)				(1)	(1)	(1)	(3)	(1)	
22	Motor	(068)			(1)		(1)	(1)	(3)		
23	Clerk	(055)			(1)				(1)		(1)
24	Section leader	(652)				(6)	(6)	(5)	(17)		
25	Hygienist (meat and dairy)	(120)								(1)	(1) ^{v-c}
26	Corporal				2	7	7	1	17		
27	Duty	(566)			(1)				(1)		
28	Troop clerk	(055)			(1)	(1)	(1)	(1)	(4)		
29	Assistant section leader	(652)				(6)	(6)		(12)		
30	Private, first class, and								90	8	2
31	Private, including:				23	118	74	51	176	9	3
32	Bugler	(021)			(1)	(1)	(1)		(3)		
33	Chauffeur	(245)	5th		(4)	(16)	(8)	(4)	(32)		
34	Chauffeur	(245)	6th		(3)	(16)	(8)	(5)	(32)		
35	Clerk, general	(055)	5th		(2)	(2)			(4)		(3)
36	Clerk, admission	(055)	5th				(2)	(1)	(3)		
37	Clinical horseshoer	(094)	3d					(1)	(1)	(1)	
38	Cook	(060)	3d		(1)	(1)	(2)	(1)	(5)		
39	Cook	(060)	4th		(1)	(1)	(2)	(1)	(5)		

40	Cook's helper	(521)		(1)	(2)	(3)	(1)	(7)		
41	Litter bearer		6th		(8)			(8)		
42	Litter bearer				(8)					
43	Mechanic, auto	(014)	2d	(1)				(1)		
44	Mechanic, auto	(014)	3d	(1)	(1)	(1)	(1)	(4)		
45	Mechanic, auto	(014)	4th	(2)	(1)			(3)		
46	Mechanic, general	(121)	5th	(1)	(1)	(2)		(4)		
47	Motorcyclist	(678)	5th	(1)				(1)		
48	Motorcyclist	(678)	6th	(1)	(1)	(1)	(2)	(5)		
49	Orderly	(695)		(2)	(1)	(2)		(5)		(2)
50	Orderly, ambulance	(696)			(24)			(24)		
51	Orderly, ambulance, (horse)	(696)					(12)	(12)		
52	Orderly, horseholder	(622)					(3)	(3)		
53	Pharmacist	(149)	3d			(2)		(2)	(1)	
54	Pharmacist, veterinary	(150)	4th				(1)	(1)	(1)	
55	Stenographer	(213)	3d	(1)				(1)	(1)	
56	Technician, medical	(123)	4th		(4)			(4)	(1)	
57	Technician, medical	(123)	5th		(4)	(4)		(8)	(2)	
58	Technician, medical	(123)	6th			(6)		(6)	(1)	
59	Technician, sanitary	(196)	4th		(4)			(4)	(1)	
60	Technician, surgical	(225)	3d		(6)			(6)	(2)	
61	Technician, surgical	(225)	4th		(6)	(4)		(10)	(2)	
62	Technician, surgical	(225)	5th			(6)		(6)	(1)	
63	Technician, surgical	(225)	6th			(8)		(8)		
64	Technician, surgical, vet.	(226)	3d				(1)	(1)	(1)	
65	Technician, surgical, vet.	(226)	5th				(5)	(5)	(1)	
66	Technician, veterinary	(250)	4th				(1)	(1)	(1)	
67	Technician, veterinary	(250)	5th				(5)	(5)	(1)	
68	Ward attendant					(4)		(4)		
69	Basic	(521)			(10)	(8)	(6)	(24)		
70	Total enlisted			34	137	93	64	328	30	8
71	Aggregate		4	36	144	100	68	352	30	12
72	Q-Animals, including						16	16		
73	Horse, draft						(4)	(4)		
74	Horse, riding						(12)	(12)		
75	Q-Ambulance, field, cross country				24			24		
76	Q-Car, light, 5-pass., sedan									1
77	Q-Motorcycle, solo			1	1	1		3		
78	Q-Motorcycle, with side car			1			2	3		
79	Q-Trailer, 1-ton, cargo			1	1	1	1	4		
80	Q-Trailer, tank, water, 250-gal.			1	1	3	1	6		
81	Q-Trailer, 2-horse van						2	2		
82	Q-Truck, ½-ton, command			2	3	3	1	9		1
83	Q-Truck, ½-ton, pickup			2	1	3		6		
84	Q-Truck, 1½-ton, cargo			4	3	7	4	18		1
85	Q-Truck, 1½-ton, cargo with winch			2	1	3		6		
86	Q-Truck, 2½-ton, cargo with stock rack body						4	4		

REMARKS

* Insert number of Squadron.

a May be Medical Administrative Corps.

b Division Surgeon and Squadron Commander.

c Chaplain.

d Dental.

e Meat and Dairy Inspector.

f Division Surgeon's office includes:

1 Lt. Colonel, Division Surgeon and Squad Commander.

1 Major, Medical Inspector.

1 Major, Division Dental officer.

1 Major, Division Veterinarian.

1 Captain, Office Executive.

The Division Surgeon's office is not an integral part of the Squadron and is not carried in the totals of the Squadron.

The serial number symbol shown in parenthesis is an inseparable part of the specialist designation. A number below 500 refers to an occupational specialist whose qualification analysis is found in Section I AR 615-26. A number above 500 refers to a Military occupational specialist, listed in the Index, Section II, AR 615-26.

Summary of Specialist's Ratings

Class No.

2d 1

3d 20

4th 23

5th 68

6th 59

Total 176

	1	2	3	4	5	6	7	8	9	10
	Unit	Specification Serial Number	Specialists' Ratings (class)	Squadron Hdrs.	Squadron Hdrs. Det.	Det. Hdrs.	General and Medical Supply Section	Motor Maintenance Section	Total Det.	Enlisted Cadre
2	Lieutenant colonel			1 ^b					1	
3	Major			1					1	
4	Captain			1 ^c		1 ^a			2	
5	Lieutenant			1 ^a			1 ^a		2	
6	Total commissioned			4		1	1		6	
7	Master sergeant				1				1	1
8	Squadron sergeant major	(062)			(1)				(1)	(1)
9	Technical sergeant					1	1	1	3	3
10	First sergeant					(1)	(1)		(1)	(1)
11	Squadron motor sergeant							(1)	(1)	(1)
12	Squadron supply sergeant								(1)	(1)
13	Staff sergeant				1		1		2	2
14	Medical supply sergeant						(1)		(1)	(1)
15	Personnel sergeant major	(052)			(1)				(1)	(1)
16	Sergeant					2	1		3	1
17	Clerk	(065)					(1)		(1)	
18	Mess and Supply	(124)				(1)			(1)	
19	Motor	(068)				(1)			(1)	
20	Corporal				1	1			2	
21	Duty	(566)			(1)				(1)	
22	Detachment clerk	(055)				(1)			(1)	
23	Private, first class				7	8	5	3	{ 8 }	1
24	Private								{ 15 }	
25	Bugler	(021)			(1)				(1)	
26	Chauffeur	(245)	5th		(1)	(1)	(2)		(4)	
27	Chauffeur	(245)	6th			(1)	(2)		(3)	
28	Clerk, general	(055)	5th		(1)		(1)		(2)	
29	Cook	(060)	3d			(1)			(1)	
30	Cook	(060)	4th			(1)			(1)	
31	Cook's helper					(1)			(1)	
32	Mechanic, auto	(014)	2d					(1)	(1)	
33	Mechanic, auto	(014)	3d					(1)	(1)	
34	Mechanic, auto	(014)	4th			(1)		(1)	(2)	
35	Mechanic, general	(121)	5th			(1)			(1)	
36	Motorcyclist	(678)	5th			(1)			(1)	
37	Motorcyclist	(678)	6th		(1)				(1)	
38	Orderly	(695)			(2)				(2)	
39	Stenographer	(213)	3d		(1)				(1)	
40	Total enlisted				10	12	8	4	34	8
41	Aggregate			4	10	13	9	4	40	8
42	Q-Motorcycle, solo				1				1	
43	Q-Motorcycle, with side car					1			1	
44	Q-Truck, 1/2-ton, command				1	1			2	
45	Q-Truck, 1/2-ton, pickup						1	1	2	
46	Q-Truck, 1 1/2-ton, cargo					1	3		4	
47	Q-Truck, 1 1/2-ton, cargo, with winch							2	2	
48	Q-Trailer, tank, water, 250-gal.					1			1	
49	Q-Trailer, 1-ton, cargo					1			1	

REMARKS

^a May be Medical Administrative Corps.

^b Commanding officer is also Division Surgeon.

^c Chaplain.

Summary of Specialists Ratings

Class

No.

2d

1

3d

3

4th

3

5th

8

6th

4

Total

19

The serial number symbol shown in parenthesis is an inseparable part of the specialist designation. A number below 500 refers to an occupational specialist whose qualification analysis is found in Section I AR 615-26. A number above 500 refers to a Military occupational specialist, listed in the Index, Section II, AR 615-26.

Squadron Headquarters. Squadron headquarters is an agency of command and includes the commander, the executive officer, the adjutant, a medical administrative corps officer, the commanding officer of headquarters detachment (the latter is also the division medical supply officer), and certain enlisted personnel who are members of the headquarters detachment.

The squadron commander. The commanding officer of the medical squadron is directly responsible to the division commander for the efficient administration, discipline, training, and operation of the medical squadron in all situations. He is also the division surgeon. His duties are analogous to those of the commanding officer of the medical regiment of an infantry division.

The executive officer. The executive officer of the medical squadron is the principal assistant and advisor of the squadron commander. He carries on the routine administration of the medical squadron, and his duties as a whole are identical to those of the executive officer of the medical regiment of an infantry division.

The Headquarters Detachment, Medical Squadron

Organization. The headquarters detachment consists of 6 officers and 34 enlisted men. (See Plate 8.) It is divided into five sections:

Squadron headquarters.	General and medical supply section.
Squadron headquarters detachment.	Motor maintenance section.
Detachment headquarters.	

Functions. The headquarters detachment has the following basic functions:

The supply of the medical squadron.

The medical supply of the entire division served.

The assignment of personnel for the operation of squadron headquarters.

Personnel. For strength of personnel and its distribution see Plate 8. It is employed by the detachment commander in such a manner as to execute best the functions required of the detachment, due consideration being given to the training and duty requirements of the squadron headquarters detachment.

Detachment commander. The detachment commander of the headquarters detachment is responsible for its organization, training, supply, discipline, and operation.

He is the squadron supply officer and as such is a staff officer of the squadron commander.

He is division medical supply officer and as such is an assistant of the division surgeon, who is also the squadron commander.

In his combined capacity of detachment commander and general and medical supply officer, he directs and coordinates the activities of his enlisted personnel and the detachment equipment and transportation in such a manner as to execute best the functions of the company.

Squadron headquarters detachment. The squadron headquarters detachment consists of 10 enlisted men. Certain of these enlisted men operate the squadron headquarters, handling all squadron administrative matters, correspondence, mail, orders pertaining to field operations, and the message center.

Detachment headquarters. Detachment headquarters consists of 1 officer and 12 enlisted men. The personnel handles administrative matters pertaining to the headquarters detachment.

General and medical supply section. The general and medical supply section consists of 1 officer and 8 enlisted men. They handle all general (unit) and medical supplies and transportation pertaining to these supplies. They receive, check, transport, sort, and issue all supplies.

Transportation. The transportation of the headquarters detachment consists of:

1 motorcycle with side car	1 trailer, 1-ton, cargo
1 motorcycle, solo	1 trailer, tank, water, 250-gallon
2 trucks, 1/2-ton, command	4 trucks, 1 1/2-ton, cargo
2 trucks, 1/2-ton, pick-up	2 trucks, 1 1/2-ton, cargo, with winch

Collecting Troop, Medical Squadron

Organization. The collecting troop of the medical squadron consists of 7 officers and 135 enlisted men. (See Plate 9.) It is divided for functional purposes into:

Troop headquarters.

2 collecting platoons, identical in organization, equipment, and transportation.

Functions. The collecting troop is capable of establishing and operating 2 collecting stations. It evacuates the squadron aid stations and collects casualties in rear of the squadron aid stations. It provides temporary care and treatment for casualties at the collecting stations. The collecting troop also evacuates the collecting stations, transporting the casualties to the clearing station (ambulance section of the collecting platoon). Its functions, therefore, are analogous to the combined functions of the collecting company and the ambulance company of the infantry division. However, the cavalry division being a highly mobile unit, care and treatment of patients must be more temporary, and the collecting troop must be ready to make frequent and rapid moves.

Personnel. The personnel strength of the collecting troop and its distribution is shown in Plate 9. It includes 1 captain, 6 first lieutenants, 1 technical sergeant, 3 staff sergeants, 8 sergeants, 7 corporals, 40 privates first class, and 78 privates.

Troop Headquarters. The headquarters of the collecting troop is a tactical and an administrative unit. It consists of 1 medical officer, (a captain, troop commander) and 19 enlisted men. Its functions are analogous to those of the combined headquarters of the collecting company and the ambulance company of the infantry division plus the tactical functions of the respective battalion headquarters of the collecting battalion and the ambulance battalion of the medical regiment.

Troop commander. The troop commander is responsible for the administration and operation of the collecting troop. He is responsible for the evacuation of squadron aid stations, providing a place of temporary treatment at collecting stations, and evacuating collected casualties to the clearing station by means of motor ambulances.

Collecting platoon. There are 2 collecting platoons in the collecting troop. Each collecting platoon consists of:

A collecting station section.

A bearer section.

An ambulance section.

Each collecting platoon is capable of operating a collecting station and furnishing transportation for the evacuation of casualties from the squadron aid stations to the clearing station. Each platoon has 3 officers and 69 enlisted men.

The collecting *station section* operates the collecting station and performs the duties incident thereto. The section has 1 officer and 13 enlisted men. The transportation consists of 1 1½-ton command truck and 1 1½-ton cargo truck.

The *bearer section* evacuates the casualties from the squadron aid stations to the collecting station. Contact is maintained with the regimental medical detachments of the cavalry regiments and supporting artillery. The section has 1 officer and 20 enlisted men. No transportation is provided.

The *ambulance section* operates the ambulance service within the zone of the unit served. The 2 ambulance sections may pool their ambulances if the situation permits, their functions simulating those of the ambulance company of the medical regiment. Each section has 26 enlisted men: 1 sergeant (the section leader), 1 corporal (assistant section leader), and 24 privates first class or privates. The privates first class and privates are ambulance orderlies and chauffeurs. Each section has 12 field ambulances.

Equipment, Supplies, and Transportation of the Collecting Troop. The *equipment* for a collecting troop is authorized by Tables of Basic Allowances and prescribed by Tables of Equipment. It consists of drugs, surgical instruments, simple sterilizing apparatus, blankets, litters, tentage, and such other supplies necessary for temporary treatment of casualties.

General and medical supplies are received through the general and medical supply section of the headquarters detachment of the medical squadron.

The transportation of the collecting troop consists of:

24 ambulances, field	1 trailer, 1-ton, cargo
1 motorcycle, solo	1 trailer, tank, water, 250-gallon
1 truck, 1/2-ton, pick-up	3 trucks, 1 1/2-ton, cargo
3 trucks, 1/2-ton, command	1 truck, 1 1/2-ton, cargo, with winch

1	2	3	4	5	6	7	8	9
Unit	Specialists' ratings (class)	Troop headquarters	1st collecting platoon			Total troop (troop headquarters and 2 platoons)	Enlisted cadre	Remarks
		Station section	Bearer section	Ambulance section				
2 Captain		1				1		
3 Lieutenant		1	1	1		6		
4 Total commissioned		1	1	1	1	7		
5 Technical sergeant, including		1				1	1	
6 First sergeant (585)		(1)				(1)	(1)	
7 Staff sergeant, including		1	1			3	1	
8 Motor (068)		(1)				(1)	(1)	
9 Platoon (651)			(1)			(2)		
10 Sergeant, including		2	1	1	1	8	2	
11 Mess (124)		(1)				(1)	(1)	
12 Section leader (652)			(1)	(1)	(1)	(6)		
13 Supply (186)		(1)				(1)	(1)	
14 Corporal, including		1	1	1	1	7		
15 Assistant section leader (652)			(1)	(1)	(1)	(6)		
16 Troop clerk (055)		(1)				(1)		
17 Private, first class								
18 Private								
19 Ambulance orderly (696)						40	6	
20 Bugler (021)		(1)			(12)	(24)		
21 Chauffeur (245)	5th	(2)	(1)			(1)		
22 Chauffeur (245)	6th	(2)	(1)		(6)	(16)		
23 Clerk, general (055)	5th		(1)			(2)		
24 Cook (060)	3d	(1)				(1)	(1)	
25 Cook (060)	4th							
26 Cook's helper (521)		(2)				(2)		
27 Litter bearer (521)	6th			(4)		(8)		
28 Litter bearer (521)				(4)		(8)		
29 Mechanic, automobile (014)	3d	(1)				(1)		
30 Mechanic, automobile (014)	4th	(1)				(1)		
31 Mechanic, general (121)	5th	(1)				(1)		
32 Motorecyclist (678)	6th	(1)				(1)		
33 Orderly (695)		(1)				(1)		
34 Technician, medical (123)	4th		(1)	(1)		(4)	(1)	
35 Technician, medical (123)	5th		(1)	(1)		(4)	(1)	
36 Technician, sanitary (196)	4th		(1)	(1)		(4)	(1)	
37 Technician, surgical (225)	3d		(2)	(1)		(6)	(1)	
38 Technician, surgical (225)	4th		(2)	(1)		(6)	(1)	
39 Basic (521)				(5)		(10)		
40 Total enlisted		19	13	20	26	137	10	
41 Aggregate		20	14	21	27	144	10	
42 Q Ambulance, field, cross country					12	24		
43 Q Motorcycle, solo		1				1		
44 Q Trailer, tank, water, 250-gallon		1				1		
45 Q Trailer, 1-ton, cargo		1				1		
46 Q Truck, 1/2-ton, command		1	1			1		
47 Q Truck, 1/2-ton, pick-up		1				1		
48 Q Truck, 1 1/2-ton, cargo		1	1			3		
49 Q Truck, 1 1/2-ton, cargo, with winch		1				1		

Summary of specialists' ratings

Class	Number
3d	8
4th	16
5th	23
6th	25
Total	72

The serial number symbol shown in parentheses is an inseparable part of the specialist designation. A number below 500 refers to an occupational specialist whose qualification analysis is found in section I, AR 615-26. A number above 500 refers to a military occupational specialist listed in section II, AR 615-26.

Plate 9. T/O 8-87. Organization of the Collecting Troop, Medical Squadron.

Clearing Troop, Medical Squadron

Organization. The clearing troop of the medical squadron consists of 7 officers and 93 enlisted men. (See Plate 10.) It is divided for functional purposes into:

Troop headquarters.

2 clearing platoons, identical in organization, equipment, and transportation.

Functions. The clearing troop is so organized that each of the clearing platoons can establish and operate a small clearing station. In general, its functions are analogous to those of the clearing company of the medical regiment of the infantry division, square.

Personnel. The personnel strength of the clearing troop and its distribution are shown in Plate 10. It consists of 1 captain, 6 first lieutenants (2 of whom are dental officers), 1

	1	2	3	4	5	6	7
	Unit	Specialists' ratings (class)	Troop headquarters	Clearing platoon	Total troop (troop headquarters and 2 platoons)	Enlisted cadre	Remarks
2	Captain.....		1		1		
3	Lieutenant.....		(41) 3		(42) 6		
4	Total commissioned.....		1	3	7		^d Dental.
5	Technical sergeant, including.....		1		1	1	Summary of specialists ratings
6	First sergeant (585).....	(1)			(1)	(1)	
7	Staff sergeant, including.....			1	2		Class
8	Platoon (651).....			(1)	(2)		
9	Sergeant, including.....		3	3	9	2	Number
10	Mess (124).....	(1)			(1)	(1)	
11	Motor (068).....	(1)			(1)		3d..... 5
12	Section leader (652).....			(3)	(6)		4th..... 6
13	Supply (186).....	(1)		(1)	(1)	(1)	5th..... 22
14	Corporal, including.....		1	3	7		6th..... 23
15	Assistant section leader (652).....			(3)	(6)		
16	Troop clerk (055).....		(1)		(1)		Total..... 56
17	Private, first class.....		16	20	25	7	The serial number symbol shown in parentheses is an inseparable part of the specialist designation. A number below 500 refers to an occupational specialist whose qualification analysis is found in section I, A R 615-26. A number above 500 refers to a military occupational specialist listed in section II, A R 615-26.
18	Private.....				49		
19	Bugler (021).....	5th	(1)		(1)		
20	Chauffeur (245).....	6th	(2)	(3)	(8)		
21	Chauffeur (245).....	6th	(2)	(3)	(8)		
22	Clerk, admission (055).....	5th		(1)	(2)		
23	Cook (060).....	3d	(2)		(2)	(1)	
24	Cook (060).....	4th			(2)		
25	Cook's helper (521).....		(3)		(3)		
26	Mechanic, automobile (014).....	3d	(1)		(1)		
27	Mechanic, general (121).....	5th		(1)	(2)		
28	Motorcyclist (678).....	6th	(1)		(1)		
29	Orderly (695).....		(2)		(2)		
30	Pharmacist (149).....	3d		(1)	(2)	(1)	
31	Technician, medical (123).....	5th		(2)	(4)	(1)	
32	Technician, medical (123).....	6th		(3)	(6)	(1)	
33	Technician, surgical (225).....	4th		(2)	(4)	(1)	
34	Technician, surgical (225).....	5th		(3)	(6)	(1)	
35	Technician, surgical (225).....	6th		(4)	(8)	(1)	
36	Ward attendant (521).....			(2)	(4)		
37	Basic (521).....			(4)	(8)		
38	Total enlisted.....		21	36	93	10	
39	Aggregate.....		22	39	100	10	
40	Q Motorcycle, solo.....		1		1		
41	Q Trailer, tank, water, 250-gallon.....		1	1	3		
42	Q Trailer, 1-ton, cargo.....		1		1		
43	Q Truck, 1½-ton, command.....		1	1	3		
44	Q Truck, 1½-ton, pick-up.....		1	1	3		
45	Q Truck, 1½-ton, cargo.....		1	3	7		
46	Q Truck, 1½-ton, cargo, with winch.....		1	1	3		

Plate 10. T/O 8-88. Organization of the Clearing Troop, Medical Squadron.

technical sergeant, 2 staff sergeants, 9 sergeants, 7 corporals, 25 privates first class, and 49 privates.

Troop Headquarters. The headquarters of the clearing troop is a tactical and an administrative unit. It consists of 1 officer and 21 enlisted men. The captain, a medical officer, is the troop commander.

Functions. The functions of the hospital troop are analogous to those of the clearing

company of the medical regiment plus the tactical functions of the battalion headquarters of the hospital battalion of the medical regiment.

Troop commander. The troop commander of the clearing troop is responsible for its administration and operation in accordance with the orders and policies of the medical squadron commander. He is responsible for the establishment of a clearing station or stations as the situation demands.

Clearing platoon. There are 2 clearing platoons in the clearing troop. Each clearing platoon may be divided into:

A station section.

A transportation section.

Each clearing platoon is capable of establishing and operating a small clearing station. Emergency treatment and such treatment as is necessary to prepare casualties for further evacuation are provided. The duties of the commissioned and enlisted personnel are analogous to those of like personnel of the clearing platoon of the clearing company of the medical regiment. The platoon consists of 3 officers (3 first lieutenants, 1 of whom is a dental officer) and 36 enlisted men: 1 staff sergeant (platoon sergeant), 3 sergeants (section leaders), 3 corporals (assistant section leaders) 29 privates first class or privates. The privates first class and privates are clerks, mechanics, chauffeurs, pharmacists, medical technicians, surgical technicians, and attendants.

Equipment, Supplies, and Transportation of the Clearing Troop. The *equipment* for a clearing troop is authorized by Tables of Basic Allowances and prescribed by Tables of Equipment. It consists of such equipment as is necessary for the operation of 2 small clearing stations of 100 bed capacity each. It is even more mobile than the clearing company of the medical regiment, yet equipment is provided for emergency surgical cases. The equipment is packed in standard containers and is similar to that of the clearing company.

Supplies, both general and medical, are obtained through the headquarters detachment of the medical squadron.

The *transportation* of the clearing troop consists of:

- | | |
|-------------------------------------|-------------------------------------|
| 1 motorcycle, solo | 7 trucks, 1½-ton, cargo |
| 3 trailers, tank, water, 250-gallon | 3 trucks, 1½-ton, cargo, with winch |
| 1 trailer, 1-ton, cargo | 3 trucks, ½-ton, command |
| 3 trucks, ½-ton, pick-up | |

The Veterinary Troop, Medical Squadron

Organization. The veterinary troop of the medical squadron consists of 4 officers and 64 enlisted men. (See Plate 11.) It is divided for functional purposes into:

- | | |
|-----------------------------|------------------------------|
| Troop headquarters. | Second platoon (collecting). |
| First platoon (collecting). | Third platoon (clearing). |

Functions. The veterinary troop provides the evacuation and temporary treatment facilities for animals as does the collecting and clearing troops for men.

Personnel. The personnel strength of the veterinary of the medical squadron and its distribution are shown in Plate 11. It consists of 1 captain (commanding officer), 3 first lieutenants, 1 technical sergeant, 3 staff sergeants, 8 sergeants, 17 privates first class, and 34 privates.

Troop Headquarters. The headquarters of the veterinary troop is a tactical and an administrative unit. It consists of 1 veterinary officer and 14 enlisted men. A captain commands the veterinary troop. He is responsible for the administration and operation of the troop in accordance with the orders and policies of the medical squadron commander.

1st and 2d platoons (collecting). The 1st and 2d platoons are identical in organization, transportation, and equipment. They are the collecting platoons and evacuate the veterinary aid stations by means of lead lines. Each platoon consists of 1 veterinary officer and 21 enlisted men.

3d platoon (clearing). In combat the 3d platoon establishes the veterinary clearing station which provides temporary care and treatment for the animals until they can be evacuated farther to the rear. The location of the clearing station depends upon the type of operation employed by the cavalry division. It consists of 1 veterinary officer and 8 enlisted men. (See Plate 11.)

1	2	3	4	5	6	7	8
Unit	Specialists' ratings (class)	Troop headquarters	1st platoon (collecting)	3d platoon (clearing)	Total (troop headquarters, 2 collecting platoons, and 1 clearing platoon)	Enlisted cadre	Remarks
Captain.....		b1			1		
First lieutenant.....			b1	1	3		
Total commissioned.....		1	1	1	4		^b Mounted on horse.
Technical sergeant, including.....		1			1	1	Summary of specialists' ratings
First sergeant (585).....	(1)				(1)	(1)	
Staff sergeant, including.....			1	1	3		Class
Platoon (651).....			(1)	(1)	(3)		
Sergeant, including.....		3	2	1	8	2	Number
Mess (124).....	(1)				(1)	(1)	
Motor (068).....	(1)				(1)	(1)	3d..... 4
Section leader (652).....		(b1) 2	(1)	(5)			4th..... 3
Supply (186).....	(1)			(1)	(1)		5th..... 15
Corporal, including.....		1			1		6th..... 7
Troop clerk (055).....	(1)				(1)		Total..... 29
Private, first class.....		9	18	6	17	7	The serial number symbol shown in parentheses is an inseparable part of the specialist designation. A number below 500 refers to an occupational specialist whose qualification analysis is found in section I, AR 615-26. A number above 500 refers to a military occupational specialist listed in section II, AR 615-26.
Private.....					34		
Chauffeur (245).....	5th	(2)	(1)	(4)	(1)		
Chauffeur (245).....	6th	(1)	(2)	(5)			
Clerk, general (055).....	5th	(1)		(1)			
Clinical horseshoer (094).....	3d			(1)	(1)	(1)	
Cook (060).....	3d	(1)			(1)	(1)	
Cook (060).....	4th	(1)			(1)		
Cook's helper (521).....		(1)			(1)		
Mechanic, automobile (014).....	3d	(1)			(1)		
Motorcyclist (678).....	6th		(1)	(2)			
Orderly, ambulance (horse) (696).....			(6)	(12)			
Orderly, (horseholder) (622).....		(b1)	(b1)	(3)			
Pharmacist, veterinary (150).....	4th			(1)	(1)	(1)	
Technician, surgical, veterinary (226).....	3d			(1)	(1)	(1)	
Technician, surgical, veterinary (226).....	5th		(2)	(1)	(5)	(1)	
Technician, veterinary (250).....	4th			(1)	(1)	(1)	
Technician, veterinary (250).....	5th		(b1) 2	(1)	(5)	(1)	
Basic (521).....			(b1) 3		(6)		
Total enlisted.....		14	21	8	64	10	
Aggregate.....		15	22	9	68	10	
Q Animal, including.....		2	7		16		
Horse, draft.....			(2)		(4)		
Horse, riding.....		(2)	(5)		(12)		
Q Motorcycle, with side car.....			1		2		
Q Trailer, 2-horse van.....			1		2		
Q Trailer, tank, water, 250-gallon.....	1		1		1		
Q Trailer, 1-ton, cargo.....	1				1		
Q Truck, 1½-ton, command.....	1				1		
Q Truck, 1½-ton, cargo.....	2		1		4		
Q Truck, 2½-ton, cargo, with stock rack body.....			2		4		

Plate 11. T/O 8-89. Organization of the Veterinary Troop, Medical Squadron.

Transportation. The transportation of the veterinary troop of a medical squadron consists of:

16 animals (4 draft, 12 riding)
 2 motorcycles, with side car
 2 trailers, 2-horse, van
 4 trucks, 2½-ton, cargo, with stock-rack body

1 trailer, 1-ton, cargo
 1 truck, ½-ton, command
 4 trucks, 1½-ton, cargo
 1 trailer, tank, water, 250-gallon

THE MEDICAL BATTALION, INFANTRY DIVISION, "TRIANGULAR"

Introduction. The medical battalion is a divisional medical unit developed to furnish medical support for the infantry division, "triangular." Its medical service is comparable to that of the medical regiment for the infantry division, "square," with a consolidation of the battalions into a headquarters detachment and medical companies, furnishing the necessary evacuation and medical care for casualties for this new and smaller division. Because of the high mobility of the "triangular" division, the medical installations of the medical battalion must be of a more temporary nature and possess increased readiness and ability to maintain contact with the units of the division supported.

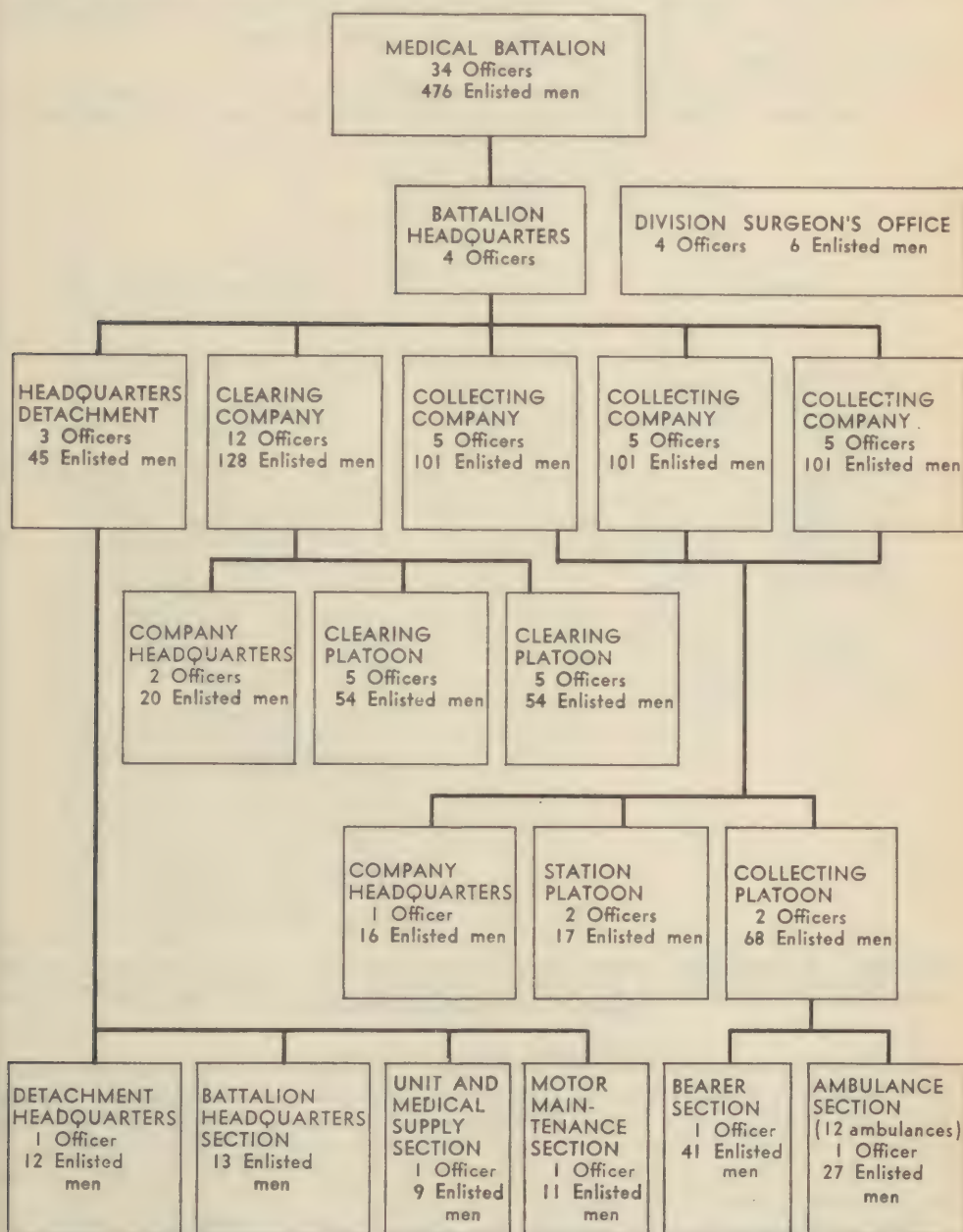


Plate 12. Suggested Functional Organization of the Medical Battalion, Infantry Division, Triangular.

Functions. The functions of the medical battalion are identical to those of the medical regiment for the infantry division, war strength. For this reason it is noted that the battalion is organized as a miniature medical regiment to maintain the best operative co-ordination of all the existing facilities and to give flexibility to expansion of the medical service when necessary. (See Plate 12.)

Personnel. There are within the medical battalion 34 officers and 476 enlisted men, a total strength of 510. (See Plates 12 and 14.) According to rank and grade they are as follows:

34 medical officers: 1 lieutenant colonel (division surgeon and commanding officer of the medical battalion), 1 major (executive and plans and training officer), 13 captains, 14 first lieutenants, and 3 second lieutenants.

2 dental officers: both first lieutenants.

476 enlisted men: 1 master sergeant, 5 first sergeants, 2 technical sergeants, 11 staff sergeants, 30 sergeants, 17 corporals, 153 privates first class, and 257 privates.

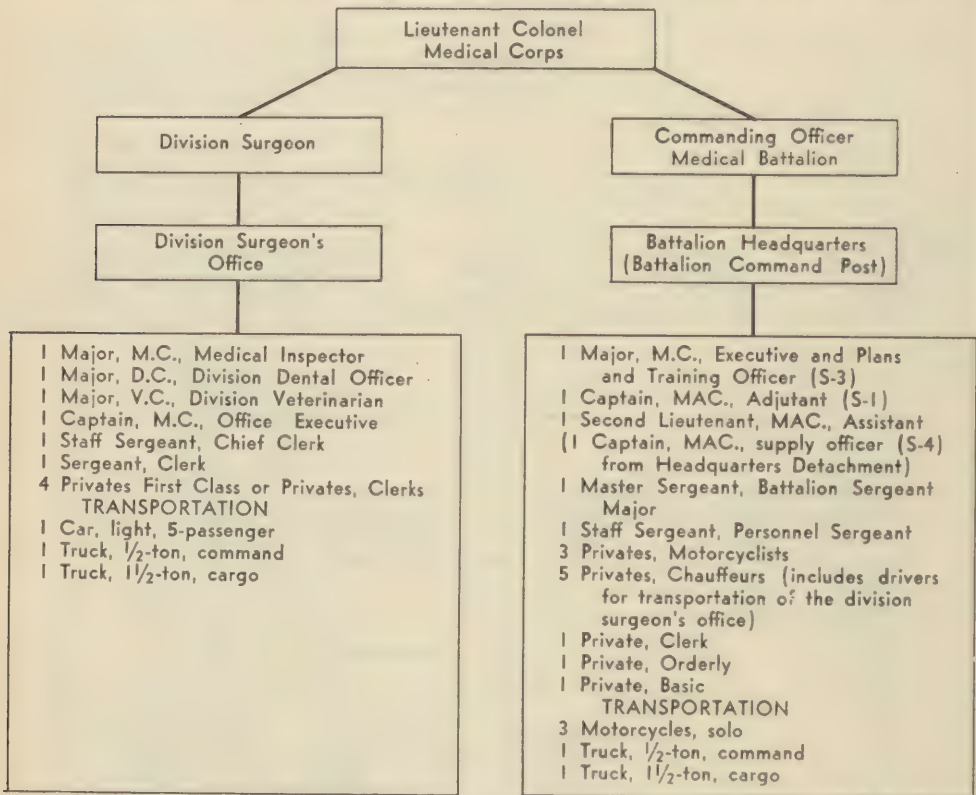


Plate 13. A Functional Organization of the Personnel and Transportation of the Battalion Headquarters of the Medical Battalion and the Division Surgeon's Office of the Triangular Division.

Battalion Headquarters. Battalion headquarters is an agency of command and consists of the commanding officer (also division surgeon), the executive and plans and training officer, the adjutant, and a medical administrative corps officer. The enlisted men who are employed in the battalion headquarters are members of the headquarters detachment. A captain of the headquarters detachment is the supply officer for the unit and the medical supply officer of the division.

Battalion Commander. The commanding officer of the medical battalion is also the division surgeon; therefore, he has a dual capacity similar to that of the commander

of the medical regiment. His duties are analogous to those of the commanding officer of the medical regiment and the division surgeon of an infantry division, "square."

The *executive and plans and training* officer and the adjutant have duties analogous to those of like officers of the medical regiment. The administrative corps officer (second lieutenant) is employed as office assistant. For a suggested functional organization of the Division Surgeon's Office and the Battalion Headquarters in accordance with Tables of Organization 8-65, October 1, 1940, see Plates 13 and 14.

1	2	3	4	5	6	7	8	9	10
Unit	Specialists' ratings (class)	Battalion headquarters (T/O 8-66)	Headquarters detachment (T/O 8-66)	Collecting company (T/O 8-67)	Clearing company (T/O 8-68)	Total battalion headquarters, headquarters detachment, clearing company, and 3 collecting companies	Enlisted cadre	Division surgeon's office	Remarks
Lieutenant colonel.....	a 1	1				1			
Major.....	b 1					1		c 3	
Captain.....	a 1	1	2	5	13			1	
First lieutenant.....			3	(4) 7	16				
Second lieutenant.....	a 1	2			3				
Total commissioned.....		4	3	5	12	34		4	
Master sergeant.....		1			1	1			
First sergeant.....		1	1	1	5	4			
Technical sergeant.....		2			2	2			
Staff sergeant.....		2	2	3	11	1	a 1		
Sergeant.....		3	7	6	30	12	b 1		
Corporal.....		2	4	3	17	6			
Private, first class.....		12	33	42	153	36	b 2		
Private.....		22	54	73	257		b 2		
Specialist.....	2d	(2)			(2)	(1)			
Specialist.....	3d	(3)	(2)	(7)	(16)	(10)			
Specialist.....	4th	(3)	(5)	(12)	(30)	(6)			
Specialist.....	5th	(7)	(11)	(18)	(58)	(6)	(4)		
Specialist.....	6th	(10)	(38)	(20)	(144)	(13)			
Unrated.....		(5)	(22)	(47)	(118)				
Basic.....		(4)	(9)	(11)	(42)				
Total enlisted.....		45	101	128	476	62	6		
Aggregate.....		4	48	106	140	510	62	10	
Q Ambulance, cross country.....				12		36			
Q Car, light, 6-passenger, sedan.....							1		
Q Motorcycle, solo.....		3				3			
Q Trailer, tank, water, 250-gallon.....		1	1	3		7			
Q Trailer, 1-ton, cargo.....		1	1			4			
Q Truck, 1½-ton, command.....		1	1	3		7	1		
Q Truck, 1½-ton, pick-up.....		2	1	1		6			
Q Truck, 1½-ton, cargo.....		7	3	1		17	1		
Q Truck, 1½-ton, cargo, winch equipped.....			1			3			
Q Truck, 2½-ton, cargo.....		2			13	15			
Q Truck, 2½-ton, cargo, winch equipped.....		1			2	3			

a Also division surgeon.
b Executive and plans and training.
c 1 medical inspector; 1 division dental officer; 1 veterinarian.
d Dental.
e Medical Administrative Corps
f Adjutant.
g Chief clerk (052)
h Clerk (055).

Plate 14. T/O 8-65. Organization of the Medical Battalion, Infantry Division, Triangular.

Headquarters Detachment, Medical Battalion

Organization. The headquarters detachment is organized for functional purposes (see Plate 15) into:

- Detachment headquarters.
- Battalion headquarters section.
- General and medical supply section.
- Motor maintenance section.

Functions. The headquarters detachment has the same functions as that of the head-

quarters and service company of the medical regiment. This headquarters detachment has as its normal functions the operation of activities necessary for the administration and maintenance of the battalion through such services as supply, mess, and clerical duty. The detachment operates the division medical distributing point.

Personnel. The distribution of the personnel of the headquarters detachment is shown in Plate 15. Exclusive of the battalion headquarters section it consists of: 1 captain, MAC. (commanding officer), 2 second lieutenants, MAC., one in charge of the general

	1	2	3	4	5	6	7	8	9
1	Unit	Specialists' ratings (class)	Battalion headquarters section	Detachment headquarters	General and medical supply section	Motor maintenance section	Total	Enlisted cadre	Remarks
2	Lieutenant colonel.....		a 1				1		
3	Major.....		1				1		
4	Captain.....		1	b 1			2		
5	Second lieutenant.....		b 1		b 1	b 1	3		* Also division surgeon. b Medical Administrative Corps.
6	Total commissioned.....		4	1	1	1	7		
7	Master sergeant.....		1				1	1	
8	Battalion sergeant major (052).....		(1)				(1)	(1)	Summary of specialists' ratings
9	First sergeant.....			1			1	1	
10	Technical sergeant.....				1		2	2	
11	Motor sergeant (068).....				(1)	(1)	(1)	(1)	
12	Supply sergeant (186).....				(1)		(1)	(1)	
13	Staff sergeant.....		1		1		2		ClassNumber
14	Medical supply sergeant (186).....				(1)		(1)		
15	Personnel sergeant major (052).....		(1)				(1)		
16	Sergeant.....			2	1		3	1	
17	Assistant supply sergeant (186).....				(1)		(1)		
18	Mess and supply sergeant (186).....			(1)			(1)	(1)	
19	Motor sergeant (068).....			(1)			(1)		2d.....2
20	Corporal.....			1	1		2	1	3d.....3
21	Company clerk (055).....			(1)			(1)	(1)	4th.....3
22	Supply clerk (055).....				(1)		(1)		5th.....7
23	Private, first class.....								6th.....10
24	Private.....including		11	10	7	6	12	2	Total.....25
25	Chauffeur (245).....	5th	(2)	(2)	(2)		(6)		The serial number symbol shown in parentheses is an inseparable part of the specialist designation. A number below 500 refers to an occupational specialist whose qualification analysis is found in section I, AR 615-26. A number above 500 refers to a military occupational specialist listed in section II, AR 615-26.
26	Chauffeur (245).....	6th	(2)	(2)	(3)		(7)		
27	Clerk, general (055).....	5th			(1)		(1)		
28	Cook (060).....	3d		(1)			(1)	(1)	
29	Cook (060).....	4th		(1)			(1)		
30	Cook's helper.....			(2)			(2)		
31	Mechanic, auto (014).....	2d				(2)	(2)	(1)	
32	Mechanic, auto (014).....	3d				(2)	(2)		
33	Mechanic, auto (014).....	4th		(1)		(1)	(2)		
34	Motorcyclist (245).....	6th	(3)				(3)		
35	Orderly.....		(3)				(3)		
36	Basic (521).....		(1)	(1)	(1)	(1)	(4)		
37	Total enlisted.....		13	14	11	7	45	7	
38	Aggregate.....		17	15	12	8	52	7	
39	Q Motorcycle, solo.....		3				3		
40	Q Trailer, 1-ton, cargo.....			1			1		
41	Q Trailer, tank, water, 250-gallon.....			1			1		
42	Q Truck, 1½-ton, command.....		1				1		
43	Q Truck, 1½-ton, pick-up.....				1	1	2		
44	Q Truck, 1½-ton, cargo.....		1	2	4		7		
45	Q Truck, 2½-ton, cargo.....				1	1	2		
46	Q Truck, 2½-ton, cargo, winch equipped.....					1	1		

Plate 15. T/O 8-66. Organization of the Headquarters Detachment, Medical Battalion Infantry Division, Triangular.

and medical supply section and the other in charge of the motor maintenance section; and 45 enlisted men. (See Plate 15).

Detachment Headquarters. The functions of detachment headquarters are similar to the company headquarters of the headquarters and service company of the medical regiment. It consists of 1 officer and 14 enlisted men.

Transportation for the detachment headquarters consists of:

1 trailer, 1-ton, cargo; 1 trailer, tank, water, 250-gallon; and 2 trucks, 1½-ton, cargo.

The Battalion Headquarters Section. The battalion headquarters section consists of 4 officers and such enlisted personnel of the detachment headquarters necessary to operate the headquarters. (See Plates 12, 13, 14, and 15.) Its functions are similar to those of the headquarters section of the headquarters and service company of the medical regiment.

The General and Medical Supply Section. The general and medical supply section consists of 1 second lieutenant and 11 enlisted men. The transportation operated by this section consists of: 1 truck, ½-ton, pick-up; 4 trucks, 1½-ton, cargo; and 1 truck, 2½-ton, cargo. Its function is similar to that of the general medical supply section of the headquarters and service company of the medical regiment.

The Motor Maintenance Section. The motor maintenance section consists of 1 second lieutenant and 7 enlisted men. The transportation operated by this section consists of: 1 truck, ½-ton, pick-up; 1 truck, 2½-ton, cargo; and 1 truck, 2½-ton, cargo, winch equipped. Its function is similar to that of the regimental motor repair section of the headquarters and service company of the medical regiment.

The Collecting Company, Medical Battalion

Organization. There are three collecting companies in the medical battalion identical in organization, transportation, and equipment. Each is organized for functional purposes (see Plate 16) into:

Company headquarters.

A station platoon.

A collecting platoon consisting of a bearer section and an ambulance section.

Functions. The collecting company of the medical battalion has the combined functions of a collecting company and an ambulance company of a medical regiment. The collecting company is responsible for the collection of all casualties from aid stations of the division, the temporary treatment of these casualties, and their evacuation to the clearing station of the clearing company. The collecting company provides the normal medical support for one infantry regiment. When standing operative procedures are in effect, one collecting company usually accompanies the regimental combat team.

Personnel. The distribution of the personnel of the collecting company of the medical battalion is shown in Plate 16. The personnel consists of 2 captains, 3 first lieutenants, 1 first sergeant, 2 staff sergeants, 7 sergeants, 4 corporals, 33 privates first class, and 54 privates, a total strength of 5 officers and 101 enlisted men.

Company Headquarters. Company headquarters consists of 1 captain and 16 enlisted men. For distribution and functional assignment of this personnel see Plate 16. The functions of the company headquarters are similar to the combined functions of the battalion headquarters of the collecting battalion and the battalion headquarters of the ambulance battalion of the medical regiment. It is an administrative as well as a tactical agency. The personnel of company headquarters provides for the control, administration, and supply of the individual collecting company.

The *transportation* of company headquarters consists of:

1 trailer, tank, water, 250-gallon	1 truck, ½-ton, pick-up
1 trailer, 1-ton, cargo	1 truck, 1½-ton, cargo
1 truck, ½-ton, command	1 truck, 1½-ton, cargo, winch equipped

The Station Platoon. The station platoon consists of 1 captain, 1 first lieutenant (both medical officers), and 17 enlisted men. For distribution and strength of personnel see Plate 16. For functional purposes the station platoon is divided into a *liaison section* and the *collecting station section*. The functions of these sections are similar to those of similar sections of a collecting company of the medical regiment.

The *transportation* of the station platoon consists of 2 1½-ton cargo trucks.

The Collecting Platoon. The collecting platoon consists of 2 officers (a captain and a first lieutenant, both medical officers) and 68 enlisted men. The functions of the collecting platoon are similar to the combined functions of the litter bearer (2d and 3d)

platoons of a collecting company and an ambulance company of the medical regiment. For functional purposes the collecting platoon has been divided into a bearer section and an ambulance section.

The *bearer section* consists of 1 first lieutenant (medical officer), 1 sergeant, 1 corporal, 16 privates first class, and 23 privates, a total strength of 1 officer and 41 enlisted men.

1	2	3	4	5	6	7	8	9
Unit	Specialists' ratings (class)	Company headquarters	Station platoon	Collecting platoon		Total company	Enlisted cadre	Remarks
				Bearer section	Ambulance section			
2 Captain.....		1	1			2		
3 First lieutenant.....			1	1	1	3		
4 Total commissioned.....		1	2	1	1	5		
5 First sergeant.....		1				1	1	
6 Staff sergeant.....			1		1	2		
7 Platoon leader (661).....			(1)		(1)	(2)		
8 Sergeant.....		4	1	1	1	7	3	Summary of specialists' ratings
9 Liaison.....		(1)				(1)		
10 Mess (124).....		(1)				(1)	(1)	
11 Motor (068).....		(1)				(1)	(1)	
12 Section leader (652).....			(1)	(1)	(1)	(3)		Class
13 Supply (186).....		(1)				(1)	(1)	Number
14 Corporal.....		1	1	1	1	4	1	
15 Assistant section leader (652).....			(1)	(1)	(1)	(3)		3d..... 2
16 Company clerk (055).....		(1)				(1)	(1)	4th..... 5
17 Private, first-class.....		3	5	16	9	33	8	5th..... 11
18 Private.....		7	9	23	15	54	54	6th..... 38
19 Ambulance orderly (696).....	6th.				(12)	(12)	(4)	Total..... 56
20 Bugler (021).....	(1)					(1)		
21 Chauffeur (245).....	5th.		(1)		(6)	(7)		
22 Chauffeur (245).....	6th.		(2)		(6)	(8)		
23 Cook (060).....	3d.	(1)				(1)	(1)	
24 Cook (660).....	4th.	(1)				(1)		
25 Cook's helper.....	(2)					(2)		
26 Litter bearer.....	6th.			(18)		(18)		
27 Litter bearer.....				(18)		(18)		
28 Mechanic, auto (014).....	4th.	(1)				(1)		
29 Orderly.....	(1)					(1)		
30 Technician, medical (123).....	4th.		(1)			(1)	(1)	
31 Technician, medical (123).....	5th.		(2)			(2)		
32 Technician, sanitary (196).....	5th.		(2)			(2)	(1)	
33 Technician, surgical (225).....	3d.		(1)			(1)	(1)	
34 Technician, surgical (225).....	4th.		(2)			(2)		
35 Basic (521).....	(3)	(3)	(3)			(9)		
36 Total enlisted.....		16	17	41	27	101	13	
37 Aggregate.....		17	19	42	28	106	13	
38 Q Ambulance, cross-country.....					12	12		
39 Q Trailer, tank, water, 250-gallon.....	1					1		
40 Q Trailer, 1-ton, cargo.....	1					1		
41 Q Truck, ½-ton, command.....	1					1		
42 Q Truck, ½-ton, pick-up.....	1					1		
43 Q Truck, 1½-ton, cargo.....	1	2				3		
44 Q Truck, 1½-ton, cargo, winch equipped.....	1					1		

Plate 16. T/O 8-67. Organization of a Collecting Company, Medical Battalion.

No transportation is provided as an organic part of the bearer section. The functions of the bearer section are similar to those of the bearer platoon of a collecting company of the medical regiment. The bearer section may be subdivided into two subsections providing 4 litter squads in each. A noncommissioned officer is placed in charge of each subsection.

The ambulance section consists of 1 first lieutenant (medical officer), 1 staff sergeant, 1 sergeant, 1 corporal, 9 privates first class, and 15 privates, a total strength of 1 officer and 27 enlisted men. The ambulance section operates 12 cross-country ambulances which are its organic transportation. The ambulance section may be divided into two subsections of six ambulances each, a noncommissioned officer in charge of each.

The functions of the ambulance section are similar to those of an ambulance company of the medical regiment.

The Clearing Company, Medical Battalion

Organization. The clearing company of the medical battalion is organized for functional purposes (see Plate 17) into:

Company headquarters.

2 clearing platoons identical in organization, transportation, and equipment.

	1	2	3	4	5	6	7
	Unit	Specialists' ratings (class)	Company headquarters	2 clearing platoons each	Total company	Enlisted cadre	Remarks
1							
2	Captain.....		1	2	5		
3	First lieutenant.....		1	(4 1) 3	7		
4	Total commissioned.....		2	5	12		^d Dental.
5	First sergeant.....		1		1	1	Summary of specialists' ratings
6	Staff sergeant.....		1	(1)	3	1	
7	Platoon leader (651).....			(1)	(2)	(1)	Class
8	Mess sergeant (124).....		(1)		(1)	(1)	
9	Sergeant.....		2	2	6	2	Number
10	Motor sergeant (668).....		(1)		(1)	(1)	
11	Section leader (652).....			(2)	(4)		
12	Supply sergeant (186).....		(1)		(1)	(1)	3d.....
13	Corporal.....		1	1	3	2	4th.....
14	Company clerk (055).....		(1)		(1)	(1)	5th.....
15	Admission clerk (055).....			(1)	(2)	(1)	6th.....
16	Private, first class.....		6	18	42	10	Total.....
17	Private.....		9	32	73		57
18	Bugler (021).....		(1)		(1)		
19	Chaufeur (245).....	5th		(3)	(6)		The serial number symbol shown in parentheses is an inseparable part of the specialist designation. A number below 500 refers to an occupational specialist whose qualification analysis is found in section I, AR 615-28. A number above 500 refers to a military occupational specialist listed in section II, AR 615-28.
20	Chaufeur (245).....	6th		(4)	(8)		
21	Cook (060).....	3d	(3)		(3)	(1)	
22	Cook (060).....	4th	(3)		(3)		
23	Cook's helper.....		(2)		(2)		
24	Mechanic, auto (014).....	4th	(1)		(1)		
25	Orderly.....		(2)		(2)		
26	Pharmacist (149).....	3d		(1)	(2)	(1)	
27	Technician, dental (067).....	4th		(1)	(2)	(1)	
28	Technician, medical (123).....	4th		(1)	(2)	(1)	
29	Technician, medical (123).....	5th		(2)	(4)	(1)	
30	Technician, medical (123).....	6th			(6)		
31	Technician, sanitary (196).....	5th		(2)	(4)	(1)	
32	Technician, surgical (225).....	3d		(1)	(2)	(1)	
33	Technician, surgical (225).....	4th		(2)	(4)	(1)	
34	Technician, surgical (225).....	5th		(2)	(4)	(1)	
35	Technician, surgical (225).....	6th		(3)	(6)	(1)	
36	Ward attendant, medical.....			(9)	(18)		
37	Ward attendant, surgical.....			(12)	(24)		
38	Basic (521).....		(3)	(4)	(11)		
39	Total enlisted.....		20	54	128	16	
40	Aggregate.....		22	59	140	16	
41	Trailer, tank, water, 250-gallon.....		1	1	3		
42	Truck, $\frac{1}{2}$ -ton, command.....		1	1	3		
43	Truck, $\frac{1}{2}$ -ton, pick-up.....		1		1		
44	Truck, $\frac{1}{2}$ -ton, cargo.....		1		1		
45	Truck, $\frac{3}{4}$ -ton, cargo.....		1	6	13		
46	Truck, $\frac{3}{4}$ -ton, cargo, winch equipped.....			1	2		

Plate 17. T/O 8-68. Organization of the Clearing Company, Medical Battalion.

Functions. The clearing company of the medical battalion has the same functions as the clearing battalion of the medical regiment. The company operates clearing stations as necessary for the sorting and treatment of patients evacuated by the collecting companies. Patients are prepared at these clearing stations for further evacuation to the rear by corps or army medical service.

Personnel. The distribution of the personnel of the clearing company is shown in Plate 17. It consists of 5 captains, 7 first lieutenants (one of whom is a dental officer), 1 first sergeant, 3 staff sergeants, 6 sergeants, 3 corporals, 42 privates first class, and 73 privates, a total strength of 12 officers and 128 enlisted men.

Company Headquarters. Company headquarters consists of 1 captain, 1 first lieutenant, and 20 enlisted men. For grade and distribution of enlisted personnel see Plate 17. The functions of company headquarters are similar to the combined functions of the battalion headquarters of a clearing battalion of the medical regiment and a company headquarters of a clearing company of the medical regiment. It is an administrative as well as a tactical agency.

The Clearing Platoons. There are two clearing platoons in the clearing company, identical in organization, transportation, and equipment. Each platoon consists of 2 captains (medical officers), 2 first lieutenants (medical officers), 1 first lieutenant (dental officer), 1 staff sergeant, 2 sergeants, 1 corporal, 18 privates first class, and 32 privates, a total strength of 5 officers and 54 enlisted men. Each clearing platoon is capable of operating a clearing station, including messing facilities, so that it may operate at considerable distances from company headquarters. For command, administration, function, and training, the clearing platoon may be further subdivided into two sections. (See Plate 17.) The functions in general of the clearing platoon are similar to those of a clearing company of the medical regiment.

The *transportation* of the clearing platoon consists of:

1 trailer, tank, water, 250-gallon

6 trucks, 2½-ton, cargo

1 truck, ½-ton, command

1 truck, 2½-ton, cargo, winch equipped

THE MEDICAL BATTALION (ARMORED)

Organization. The medical battalion (armored) (T/O 8-77) is organized (tentative) into a headquarters and headquarters detachment, a collecting company, and a clearing company. (See Plate 18.)

Headquarters and Headquarters Detachment. The headquarters and headquarters detachment is organized as follows:

Headquarters: The battalion commander and his staff. The battalion commander is also the division surgeon. In combat the battalion commander will normally accompany the division command group and will send a liaison officer to the armored brigade command group.

Detachment headquarters. The detachment headquarters includes the detachment commander and the overhead of the detachment.

Battalion headquarters. This section provides the necessary clerks, chauffeurs, motorcycle messengers, and radio operators to operate the battalion headquarters.

This section is provided with scout cars equipped with vehicular radio sets for the commander and his staff.

Supply section. This section operates as a unit supply section for the headquarters detachment, general supply section for the medical battalion, and medical supply section for the division. The detachment commander is the supply officer. This section is provided with vehicles to transport the reserve supplies and deliver these as needed to the using units.

Maintenance section. The maintenance section is commanded by the battalion motor officer. It is composed of the motor sergeant (chief mechanic), motor corporal (motor vehicle records), and the mechanics. This section performs second echelon maintenance for the vehicles of headquarters detachment and for all vehicles of the battalion which cannot be repaired by the company mechanics.

Collecting Company (A). The collecting company is organized into a company headquarters and two platoons.

Company headquarters. Company headquarters is organized and equipped to perform the normal administration, supply, mess, and motor maintenance and communication, both motorcycle messenger and radio.

Collecting platoon. The collecting platoon combines the functions of the collection, litter bearer service, and ambulance evacuation.

Platoon headquarters is provided with armored vehicles, vehicular radio sets, and motorcycle messenger.

The *ambulance section* is divided into two squads, each under a squad leader mounted on a solo motorcycle to facilitate control of the ambulances.

The litter bearers are dependent upon the ambulances for transportation.

The Clearing Company (B). The clearing company is organized with a company headquarters and two clearing platoons.

Company headquarters. The company headquarters is organized and equipped to perform the normal functions of administration and supply. The mess is organized so that a complete mess can be provided for each platoon when operating separately. Radio and motorcycle messenger communication is provided for the company.

Clearing platoon. The clearing platoon is organized and equipped to establish a complete clearing station.

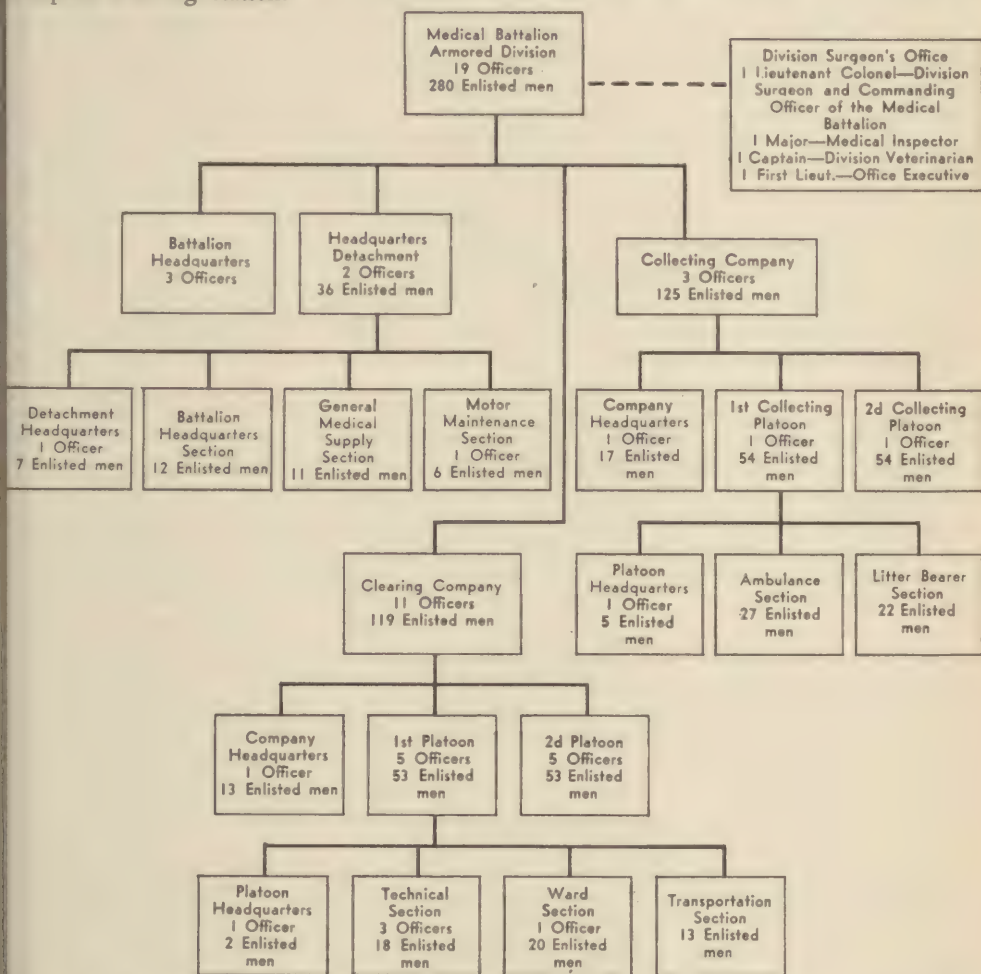


Plate 18. Functional Organization (Tentative) of the Medical Battalion, Armored Division.

The *technical section* includes a surgical team, dental surgeon, and the necessary technicians to operate the surgical, shock, preparation, and dental departments of the station.

The *ward section* includes a ward officer and the necessary ward attendants. Litters only are provided for beds in the station.

The *transportation section* includes the motor maintenance personnel and the chauffeurs.

Ward buses, each of which will accommodate eight litter cases, are provided for shelter and emergency transportation of the seriously wounded in the event it becomes necessary to move the station before the casualties can be evacuated by higher medical echelons.

CHAPTER III

THE MEDICAL SERVICE WITHIN THE DIVISION

Introduction. In order to present a clear picture of the medical service within the division a clear understanding of the medical personnel available for this purpose is necessary. This personnel consists of the officers and enlisted men within the attached medical personnel units of the division and the officers and enlisted men of the organic medical units of the division. See Plate 1. The attached medical personnel comprises the regimental medical detachments which are integral parts of their respective units. The organic medical units of the different types of divisions are the medical regiment, the medical squadron, and the medical battalion. The combined medical services of the organic and attached personnel of medical units constitute the medical service within the division. The organization of all medical units is such as to facilitate medical service for the respective unit served. This organization is fully described in detail in Chapter I for the attached medical personnel (regimental medical detachments) and in Chapter II for the divisional medical units (medical regiment, medical squadron, and medical battalion). The employment of the regimental medical detachment is discussed fully in Chapter I. The coordination and relationship of the medical service of the divisional units to the regimental medical detachments and the employment of the medical regiment and the medical squadron are related in this chapter. Basic information relative to the employment of the medical battalion, triangular division, is also included. For further information of divisional Medical Service see *The Medical Service of the Infantry Division*, Medical Field Service School, 1940.

Responsibility. Commanders of all units are responsible for the efficient operation of the medical service within their organizations. The operation of this service is the function of medical department personnel and units. The surgeon of each organization commands the medical personnel and units pertaining to his organization as a whole and coordinates and supports the activities of the medical service of subordinate organizations through the proper channels of command. Veterinary personnel, when required, is a part of the medical units and is charged with the treatment and evacuation of animals.

Principles of Evacuation. The following principles apply equally as well to the cavalry as to the infantry division.

Commencing at the front, there is a constant sorting and classification of casualties, with the primary object of returning those capable of performing duty to their commands at an early date and of sending those unfit for duty to hospitals where they can receive the best care. To secure these results the following principles are applied:

All cases which can perform duty and are not a menace to the health of the command are returned to their organizations.

No cases are sent farther to the rear than the military situation and their own condition demand.

Cases which can be treated successfully within a command are not evacuated unless it is necessary to relieve the command of their care so as to free it for movement or to make room for new cases.

Serious cases are transported the shortest possible distance consistent with the military situation and their proper treatment.

Cases requiring prolonged treatment are sent to the communications zone or to the zone of the interior as soon as their condition will permit.

The medical personnel attached to each unit cares for and collects the casualties within its own area. Evacuations from the area are made by higher units. Medical personnel and units accompany the organization to which they belong at all times. When necessary, casualties are left to be picked up by medical units from the rear. This, of course, is usually practicable only in an advance.

Clearing stations are kept sufficiently clear of patients to permit the reception of new cases and to leave the stations free for movement when required. During periods of activity, casualties are evacuated rapidly to the hospitals of the communications zone. In periods of inactivity, the evacuations are less numerous and less rapid.

Medical establishments are set up for operation only as required for the situation as it

exists or as foreseen to meet contingencies of the immediate future. Those not set up are held in reserve where they will be readily available.

In the execution of the medical service, the demands of the military situation are paramount, which means that the fighting forces are to be relieved of the presence of sick and wounded as rapidly and thoroughly as possible. The basis of decision as to details of operation is to secure the greatest good for the greatest number.

Plans and orders for evacuation treatment and hospitalization are made in conformity with and in amplification of combat plans and orders. Therefore, proper execution of the medical service requires that the medical service of the unit be informed of plans and orders in ample time to enable it to make arrangements therefor.

MEDICAL SERVICE WITHIN THE INFANTRY DIVISION

The Division Surgeon. In the infantry division the commanding officer of the medical regiment or the medical battalion (infantry division, triangular,) occupies the dual position of commander of the medical regiment (or medical battalion) and division surgeon. As division surgeon, he is a member of the special staff of the division commander. These two positions, although filled by one individual, have separate functions: one as a commander, the other as a staff member.

Duties of the division surgeon. As division surgeon his functions are as follows:

Technical adviser to the commander and staff on:

All matters pertaining to the health and sanitation of the command or of occupied territory.

The care and disposition of the sick and injured.

The training of all Medical Department troops.

The training of all troops in hygiene, sanitation, and first aid.

Technical supervision and operation of the dental and veterinary service of the division.

The direction of medical, dental, and veterinary supply.

Technical supervision, within limits prescribed by his commander, over the operations of elements of his branch in subordinate units (Regimental Medical Detachments).

Administration pertaining to casualty and other reports and records, and to personnel of the Medical Department.

The division surgeon is responsible to the division commander for the efficiency of the entire division medical service in all situations. He commands the medical regiment or medical battalion, but medical detachments, being components of subordinate units, are under the direct control of the unit commanders. Only as a staff officer, acting for the division commander and through proper channels, may the division surgeon inspect and supervise the operations of these regimental medical detachments.

The duties of the division surgeon require him to maintain an office which functions as a part of the division headquarters. If division headquarters is divided as in combat, this officer is a part of the rear echelon. The personnel for this office is shown in Plates 1, 13, and 14, Chapter II. The division surgeon divides his time to the best advantage between his office, the forward echelon of division headquarters, and the command post of the medical regiment or the medical battalion. He directs all activities either in person or through his executive officer and the medical inspector, who administers the division surgeon's office when he is absent.

As commanding officer of the medical regiment or medical battalion, the division surgeon is responsible for the training and operation of the medical regiment or medical battalion. He makes his recommendations for the tactical employment of the medical regiment or medical battalion to G-4 of the division staff. When these recommendations are approved, they form the basis of the medical plan which in turn is transmitted to the units of the medical regiment or medical battalion in the form of orders.

Relations with general and special staffs. In discharging the responsibilities of the division surgeon, business is transacted with each of the sections of the general staff. The greater part of the business, however, is with the G-4 section. The principal matters taken up with each of the *general staff sections* (FM 8-10) are as follows:

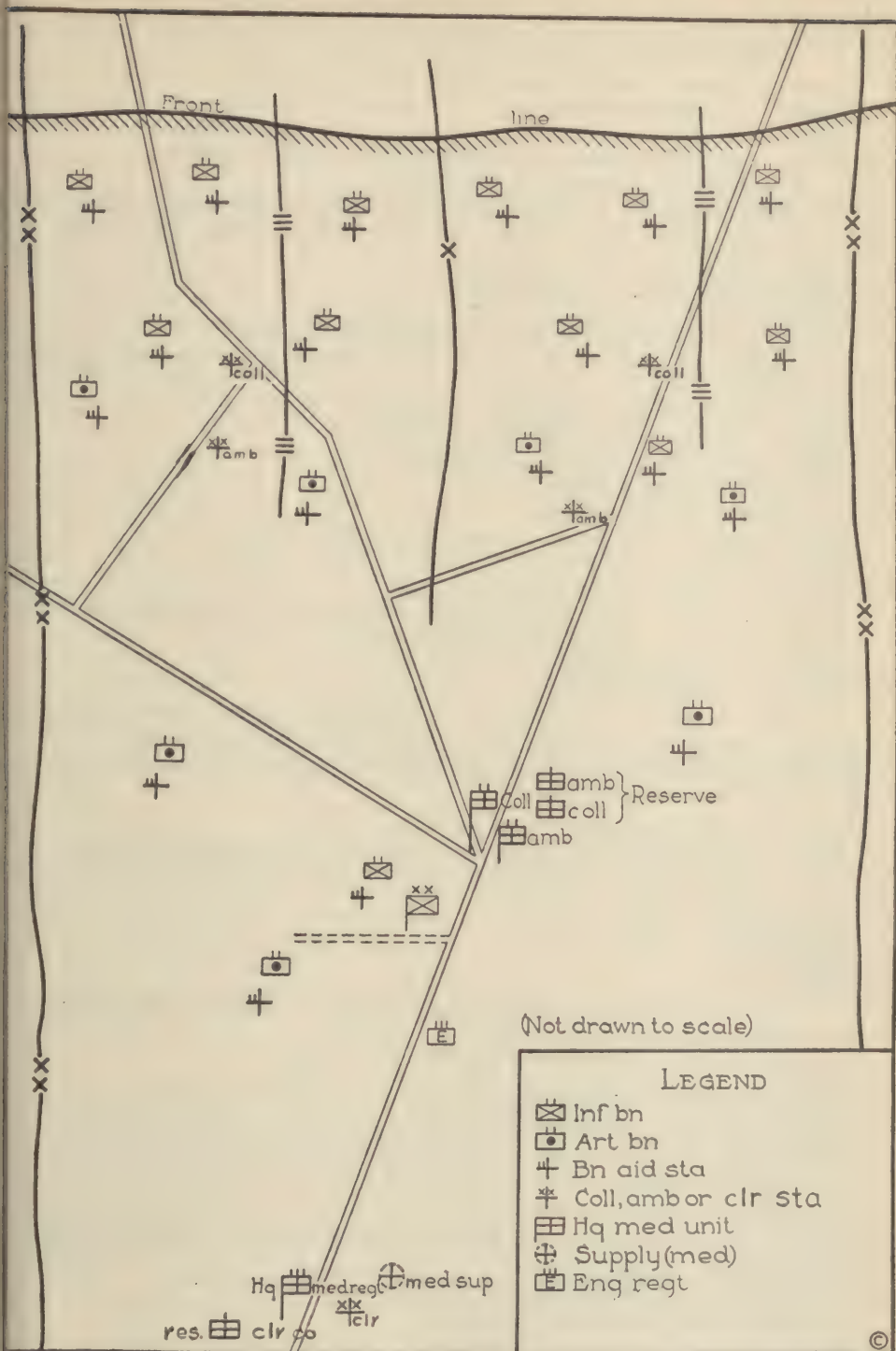


Plate 1. Medical Service of an Infantry Division (Square) in Combat (Schematic).

- G-1: Sanitation; measures for the control of communicable diseases of men and animals.
Medical problems associated with prisoners of war, refugees, and inhabitants of occupied territory.
Personnel matters, and replacements for medical units.
Reports of *human* casualties.
Employment of prisoners of war to reinforce the medical service.
- G-2: Nature and characteristics of weapons, missiles, gases, and other casualty-producing agents employed by the enemy.
The character of the organization and operation of the medical service of the enemy, especially as it relates to new methods which may deserve study and trial.
Communicable diseases in enemy forces.
Supply of maps.
- G-3: Current information of the tactical situation; future plans.
Mobilization and training of medical units; training of all personnel in hygiene and first aid.
Signal communications in medical installations.
- G-4: Tactical disposition of medical units.
Supply matters, both general and medical.
Movements of medical units.
Evacuation by higher echelons.
Reinforcement of the medical service by a higher echelon.
Hospitalization.
Shelter for medical troops and installations.
Coordination of nonmilitary welfare and relief agencies in medical installations.
Traffic restrictions affecting medical vehicles.
Reports of *animal* casualties.
Animal replacements for medical units.
All other matters which have not been specifically allotted to another general staff section, or wherein there is doubt as to which section has jurisdiction.
- The principal matters which bring the division surgeon in contact with the *special staff* of the division are as follows:
- Engineer:* Water supplies; sewerage systems.
Road construction and maintenance in and around medical installations.
Construction, repair, and maintenance of roads and structures used by the medical service.
Preparation of signs.
Camouflage.
Maps.
- Quartermaster:* Disposition of the dead at medical installations; the sanitary aspect of the disposition of all dead.
Bathing, delousing, and laundry facilities for all troops.
Clothing for gassed cases, and other patients returning to duty.
General supply of medical units.
Procurement of land and existing shelter for medical troops and installations.
Procurement and operation of utilities allocated to the Quartermaster Corps.
(See FM 100-10).
Transportation, land and water; motor and animal transport of medical units.
- Chemical Warfare officer:* Gas defense of medical troops and installations; gas masks for patients.
Types of gas used, and methods of identification.
Toxicology and pathology of new gases.
- Adjutant General:* All official correspondence through command channels.
Personnel matters.
Postal service for medical units and installations.
- Signal officer:* Signal communications for medical installations.

Judge Advocate: Questions of military and civil law.

Administration of justice in medical units.

Headquarters commandant: Physical arrangement for the surgeon's office.

Provost Marshal: Custody of sick and injured prisoners of war.

Disposition of stragglers and malingerers in medical installations.

EMPLOYMENT OF THE MEDICAL REGIMENT

Introduction. The medical regiment is responsible for the evacuation of all casualties from battalion and regimental aid stations, and from the field when, if for any reason, they cannot be collected at the aid stations by the attached medical personnel of the infantry or artillery battalions and regiments. Therefore, the medical regiment must be disposed in such a manner in all situations as to render efficiently the medical service that is required. Its dispositions and operations are subordinate to the tactical dispositions of the divisions served and must be made to fit in with and support the troops in these dispositions.

The medical regiment always accompanies the division. When the situation so requires, casualties are left, with personnel for their care, at collecting or clearing station sites to be treated or evacuated by units in the rear (corps and army medical service). The medical service available should be disposed not only to meet the immediate tactical operations of the division but also to move to support its future dispositions. "Medical service must be flexible and continuous." This is accomplished by holding out reserves and preparing for movement of the division.

Plan of Employment. The division surgeon, having been informed of the plan of the division commander, submits to G-4 his recommendations for the employment of the medical regiment. These recommendations include:

The general location of collecting stations for men.

The general location of the clearing station or stations.

The routes desired for moving the elements of the medical regiment to positions and the hours the routes are desired.

The proposed routes for ambulances.

Recommendations regarding calls on the corps or army for evacuation of casualties.

When these recommendations are approved, the division surgeon as regimental commander issues appropriate orders to the medical regiment.

Regimental Headquarters. The headquarters of the medical regiment (regimental command post) should be located where it can best direct the efforts of the regiment as a whole in meeting the specific situations confronted. In combat it is advantageous if the command post is located near the forward echelon of division headquarters. This will usually place it in the general locality of the headquarters of the collecting and ambulance battalions with which it should be established when practicable. When this is the case, the supply officer and the personnel section of the adjutant's office usually remain at the location of the headquarters and service company, near the clearing station.

The general duties of the officers of the regimental headquarters are indicated in Chapter II.

Battalion Headquarters. The battalion headquarters (battalion command posts) of the three battalions respectively should be located at the point farthest forward from which the companies in operation can be directed and supervised. With the *2d battalion (ambulance)* this will usually be at a point on the route of evacuation where ambulance routes from the collecting stations converge. The same site will frequently be suitable for the *1st battalion (collecting)* headquarters. It is very desirable that the headquarters of these battalions be at the same place whenever practicable. The *3d battalion (clearing)* headquarters is habitually located at the clearing station. It should be remembered that each of the above battalion headquarters is a tactical rather than an administrative installation.

The functions of the battalion commanders and the duties of the personnel assigned to these respective headquarters are related in Chapter II.

In Camp

The medical regiment camps or bivouacs as a unit. See Plate 3. While in camp certain functions are performed by the subordinate units of the regiment.

The Headquarters and Service Company. The headquarters and service company

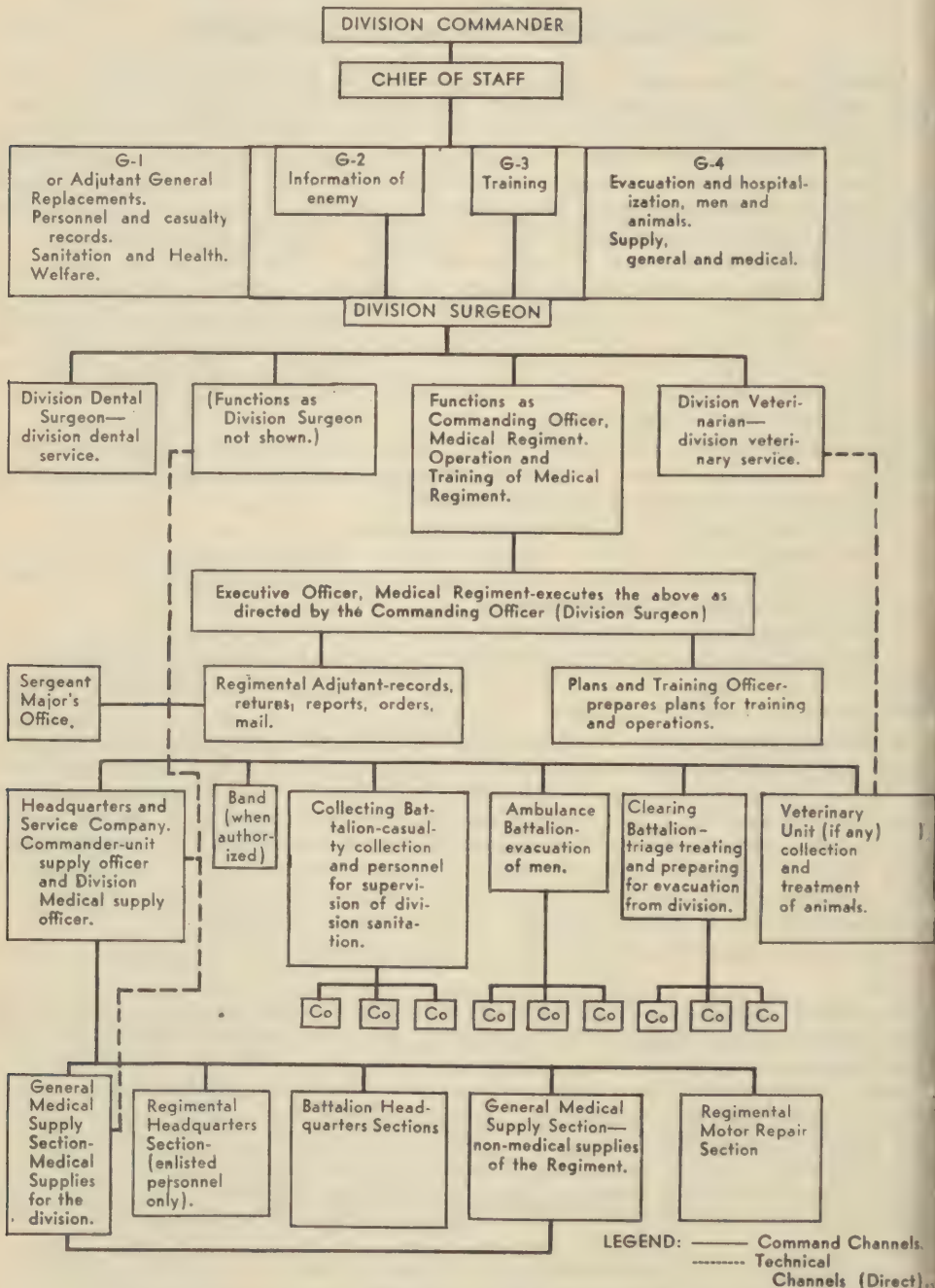


Plate 2. Division Surgeon as Commander of the Medical Regiment.
(Schematic representation of functions and channels of communication.)

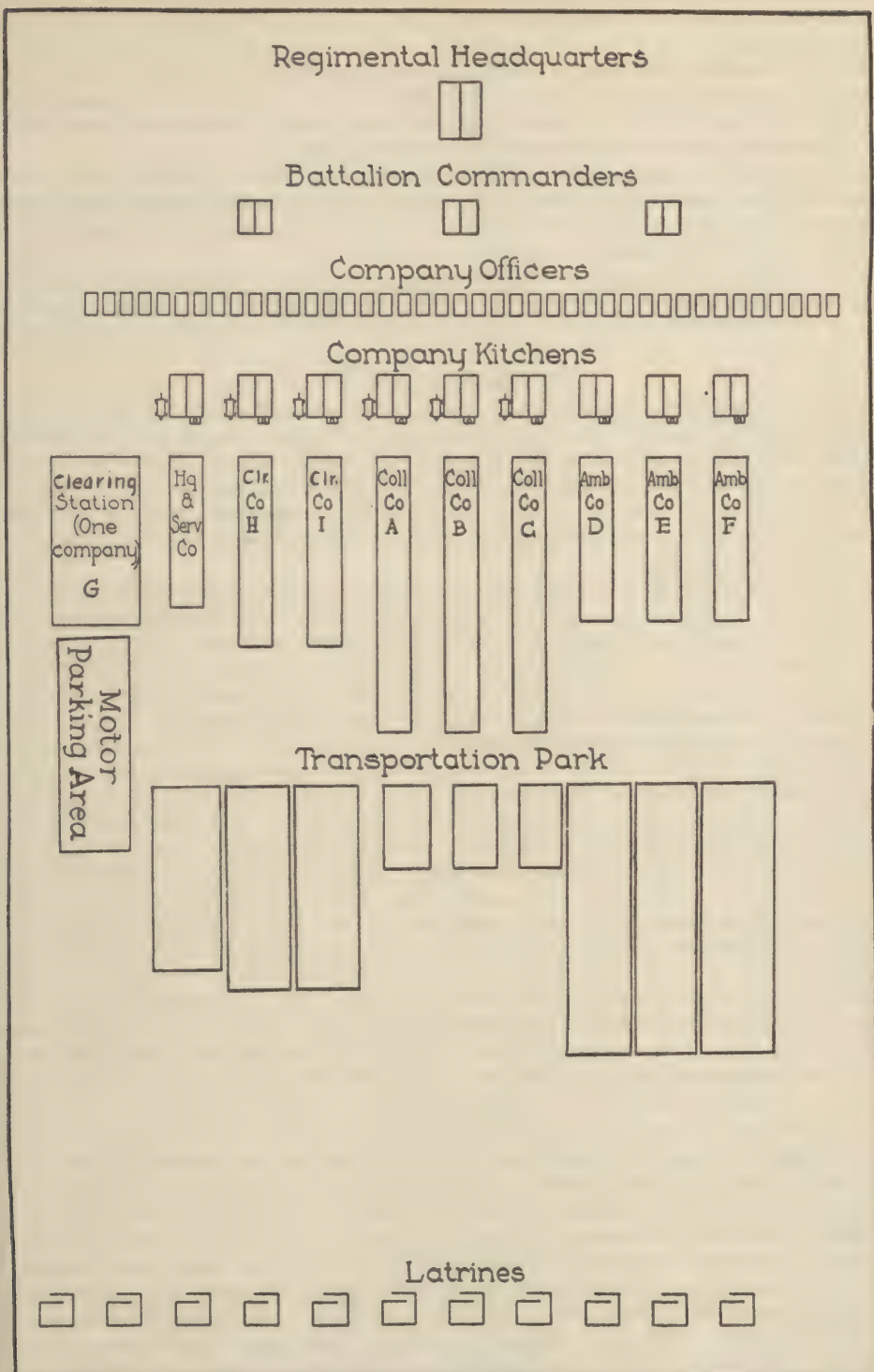


Plate 3. Conventional Ground Plan of a Medical Regiment in Camp (Schematic).

establishes a distributing point from which it distributes general supplies to the regiment and medical supplies to all troops in the division. It also operates the regimental motor repair shop.

The 1st Battalion (Collecting). The 1st battalion (collecting) performs general guard duty for the medical regiment and furnishes litter bearers and special duty detachments. Part of its personnel forms sanitation details for supervision of sanitation in areas within the division zone which do not belong to any specific organization.

The 2d Battalion (Ambulance). The 2d battalion (ambulance) collects the sick and wounded from battalion or regimental dispensaries and transports them to the hospital station of the medical regiment if in permanent camps and returns convalescents for duty to their organization dispensaries.

The 3d Battalion (Clearing). The 3d battalion (clearing) establishes a clearing station for the sick of the division if a station hospital is not present. If a station hospital is located nearby it establishes only a dispensary where sick calls for the medical regiment may be held.

On the March

The medical regiment seldom marches as a unit. It must render medical service to the division while the latter is marching. March casualties and the usual sick must be collected by the ambulance or collecting battalions or by both. Service must sometimes be provided for security detachments. Continuous clearing service may have to be provided, usually by having one clearing company function while the other companies move. Transportation of the headquarters and service company must at times be detached to draw rations and other supplies.

Detachments of the Medical Regiment. Detachments of the medical regiment are made to accompany detached major elements of the division when such divisional detachments are to operate under conditions which make it impracticable to provide medical care from the regiment. An officer of the regiment is designated as commander of the detachment of the medical regiment and while so detached operates directly under the commander of the element of the division to which attached. Plans for this service are made by the regimental commander in accordance with the plans of the division commander. The details of these plans are left to appropriate subordinate commanders.

With security detachments. Detachments of the medical regiment are usually required with security detachments of the division. The major factors that determine their size are: the size and composition of the security detachment, the probable nature of the action which may ensue, and the practicability of bringing elements of the medical regiment forward promptly to provide care for casualties from initial action. The size of these detachments will therefore vary from a reinforced section of a collecting company and a section of ambulances to a collecting company, less a platoon, and a platoon of an ambulance company.

If the divisional detachment of the division is a brigade, it will require the attachment of a *provisional medical battalion* comprised of several elements of the medical regiment. It consists of a battalion headquarters, one company of each battalion, and detachments of the headquarters and service company (vertical organization).

When a division is moving to a concentration area or making a long march, or a truck or rail movement to a new area, it is frequently desirable to have a detachment, consisting of such elements of each battalion, and of the headquarters and service company as may be necessary, precede the major portion of the division to the new area to provide for the care of the sick of the incoming elements of the division.

March Collection of Casualties. When the division is marching, collection of march casualties is usually accomplished by attaching for the march an ambulance to each battalion of infantry and to the engineer regiment. The remainder of the ambulance company may be marched at the tail of the main body or may be utilized with security detachments. As a rule, ambulances remain with the organizations to which attached until after sick call. They are then used to transport such patients as the organization surgeon desires to the hospital. Upon completion of this duty they are returned to their company for the night. When ambulances are not available for such assignment, or when due to march condi-

tions, unseasoned troops, or other factors which make it probable that march casualties will be heavy, *march collecting posts* are established along the route of march of each column. These march collecting posts are established from three to five miles apart and whenever practicable at a road junction which affords connection by lateral road to the front and rear. Such points are designated in the order of march for the day. A designated collecting and ambulance company are directed to establish these stations. The personnel at each, consisting of a noncommissioned officer and two or three privates, is carried in an ambulance with or behind the advance guard and dropped off at the designated points.

Men becoming disabled during the march are assisted along the road as may be required until the march collecting post is reached, where they are left with the collecting company personnel. They are then collected by an ambulance of a motor ambulance company utilizing lateral roads if practicable and if not, following the marching column. Those ambulances then carry the patients to a designated location, usually that of a clearing station either in the new camp or in the old.

Order of March. When marching with the division, the medical regiment (less those elements that are performing specific missions) is assigned a position in the column for the conduct of its march in accordance with standing operative procedures. When combat is imminent and march conditions cease, the medical regiment prepares at once to support the action. The medical regiment on the march is often disposed as follows:

Elements of the collection and ambulance battalions with each marching column combat-train (vertical organization).

Remainder of the regiment at the head of the motorized column of the service trains in order:

Regimental headquarters.

Ambulance battalion (less detachments).

Motor transport, collecting battalion (less detachments).

Clearing battalion (less functioning elements).

Headquarters and service company (less detachments).

The order of the medical regiment for the march contains the necessary instructions for operation of the medical service. Additional instructions ordinarily designate the companies which are to establish the service, the location of each march collecting post, when it will be established, and any special instructions as to routes and availability of roads. All other details are properly the functions of the collecting and ambulance battalion commanders who must receive the regimental order early enough to make their arrangements, issue their respective orders, and make any preliminary dispositions required by the situation.

Marches in Retrograde Movements. On the march in a withdrawal or retirement the relation of the subordinate units of the medical regiment is the same as in the advance, but the regiment is reversed, the clearing battalion preceding the other battalions. In a retrograde movement all organizations of the medical regiment transport the maximum number of patients. The clearing battalion is composed of relatively immobile units when functioning and should be moved early and well to the rear. As casualties from the rear guard require speedy evacuation, the latter is provided with relatively large detachments from the ambulance battalion.

In Combat

Tactical Principles. Stated briefly, the principles governing the employment of the medical regiment are those that govern the employment of its component units. The function of the regimental commander is to direct and control these component units as a coordinated team. The plans of the commander are general. He relies on his subordinate commanders and the regimental staff to carry out the details.

Employment of the Regiment as a Unit. In combat the medical regiment functions as a unit. Its field of activity is the division zone from the rear boundary of the division forward to the infantry battalion aid stations. Its dispositions must be so made and its work so carried out as to cause a minimum of interference with the missions of the combat elements of the division. Its combat functions must be executed with maximum rapidity. It must not lose contact with the division. It must be prepared at all times to conform

to all movements incident to tactical operations. The plans for the employment in combat should be supplemented by plans for its speedy advance or withdrawal should this become necessary.

Whether on the defensive or offensive, the medical regiment is disposed so as to meet the plan of the division commander. Each situation will vary—no two are ever exactly alike and no set rules apply to all of them. The immediate military situation must be visualized. The tactical employment of combat troops always constitutes the determining factor as to how the medical regiment should be utilized. The application of judgment, of common sense, and of general principles as to the employment of the medical troops to the concrete case in hand provides a better medical service than any rule of thumb.

When identical subordinate elements of a division medical unit are grouped together in one command, such as all collecting companies into one battalion, all ambulance companies into another, and all clearing companies into a third, the organization is said to be *horizontal*. The normal square division medical regiment is an example of this type of organization.

When, on the other hand, two or more different, but complementary, subordinate elements are grouped into a command, the organization is said to be *vertical*. The collecting company of the medical battalion, triangular division, is an example of vertical organization, in which collecting and ambulance elements are united under one command.

There are advantages and disadvantages in each type of organization; and the advantages of the one are the disadvantages of the other. Horizontal organization facilitates training and the maintenance of transport; but vertical organization is superior for functional employment of a divisional medical unit.

Medical Regiment Reserves. All elements of the regiment are not usually required initially, and it is necessary to have an element of each battalion available with which to meet developments of the situation. Battalion commanders, especially those of the ambulance and clearing battalions, frequently retain a battalion reserve for the same purpose. Reserves are under the exclusive control of the commander by whom they have been designated and cannot be employed in any way by subordinate commanders without authority. Reserve clearing companies are usually held near the site of the clearing station. Reserve collecting companies or ambulance company elements are held sufficiently far to the rear and so sheltered as to avoid probable artillery fire, near the ambulance route to the clearing station, and so situated as not to interfere with traffic. The time element involved in their probable employment does not demand that they be held unduly close to the front. All reserves will usually be employed at the time of or immediately preceding the termination of a severe action.

In Attack

In attack situations the elements of the regiment are disposed so that preferential support will be given to the main effort of the division. The problem of medical support in the offensive lies in the maintenance of contact by the collecting elements with the advancing combat units and their aid stations. The division medical service must be disposed and operated so as to be mobile and able to advance when necessary in support of the division.

In Attacks by Envelopment. One collecting station, set up by a collecting company, will normally be required to support the main attack, and one collecting station for the secondary or holding attack. If the front of the secondary attack is very wide and the litter carry is long, it is then advisable to split the collecting company and establish two collecting stations. The location of collecting stations will depend upon the formation of the attacking force, the character of the enemy resistance, and the nature of the terrain.

The collecting company in reserve should be located so as to be readily available to support the main attack.

Medical installations are established fairly close to the front line in case forward movement is anticipated. Only so much of the unit as is required to meet the situation is established, the remainder being kept mobile so as to be able to *leap-frog* forward in event of rapid movement. In envelopments the mass of the casualties are likely to occur in the enveloping or main attack force, hence the medical units should be allotted in proportion to the combat troops.

In Attack by Penetration. The mass of the enemy fires will fall on the troops massed for the penetration. The attack will probably progress slowly until the position has been ruptured. The casualties will, therefore, be heavy initially. When the hostile position has been ruptured the enemy may be expected to counterattack, and casualties will again be heavy. Casualty collection will be slow until the position is ruptured, then more rapid. Medical units are located to support the main attack. Reserve collecting units should be available to pass through the collecting company in operation or to reinforce it during the conduct of the attack.

In Pursuit. Medical installations operate from positions already occupied at the time the decision for pursuit is announced. Reserves of collecting and ambulance personnel are attached to the encircling force according to its size and composition.

In Defense

The medical service in the defense concerns itself with the support of the combat elements. In general, the medical problem is to locate medical installations so that they can carry out their technical function in support of the troops initially committed to the position, to the extensions of the flanks, or in a counterattack. This implies the holding of a reserve so that these contingencies may be met. Evacuation difficulties are principally those due to the wide extension of the front and interference caused by enemy fire. Opportunity must be taken by lulls in the combat and of darkness to push ambulance evacuation up to the aid stations. In the passive defense, movements of the combat elements are generally restricted to the interior of the position. Therefore, medical installations will not be required to displace frequently. Units of the medical regiment establish their stations generally farther to the rear than in the attack so as not to be involved in the minor fluctuations of the line. A reserve is held out so that it can be utilized in support of the division reserve when committed by the commander.

With secure flanks. Since the position is to be strongly held along the front, reserves generally are small; medical units will therefore be committed proportionately. The mass of the medical means should be in support of the casualty concentration area.

With open flanks. The medical units in active support of the combat elements of the mobile defense will be few. The remainder will be held in reserve prepared to support the extension of the flanks. Reconnaissance will be made for suitable locations to support the extension of the flank or flanks and for their occupation in case hostile envelopment threatens the initial location.

EMPLOYMENT OF THE COLLECTING COMPANY

The collecting company, of which there are three in the medical regiment, is a unit provided primarily to collect casualties in combat. It is the most forward echelon or element of the division medical regiment, its litter bearers working as far forward as the battalion aid stations of the infantry front line battalions. The company provides no hospitalization but prepares patients for further evacuation by motor ambulances of the ambulance company.

The organization and general functions of the collecting company are related in Chapter II. All the principles of operation discussed in reference to the medical regiment apply to the collecting company insofar as they are pertinent to its particular functions.

In Camp

When not confronted with actual or impending combat duties, a collecting company may provide personnel to assist the division medical inspector in the supervision of the sanitation of the division area (AR 40-205). This personnel acts as instructors to line organizations and assists in the inspection of sanitation of designated localities. This duty should never interfere with the primary combat functions or preparation therefor. In addition, collecting companies usually perform the interior guard duty for the medical regiment.

On the March

The duties of the collecting company on the march are normally limited to furnishing personnel and equipment to security detachments and to the establishment and operation of march collecting posts when such are necessary.

March Positions. Normally the collecting companies, when advancing as a part of the division, march at the rear of the main body. When the medical regiment is moving intact the collecting companies march directly behind the band, which is then at the head of the regiment.

During a march the company transport, less motorcycle, is ordinarily attached to the ambulance battalion, or the motor transport of all the collecting companies (less detachments) is assembled by the battalion commander and placed under the command of one of his officers for the movement. It rejoins its company at the end of the march or as directed by the regimental commander. As this transport is the company's combat train, it should be separated by as short a distance as practicable, so that it may rejoin promptly when needed.

March Collecting Posts. See paragraph "March Collection of Casualties," above. These posts are established and operated as follows:

Points for their location along the route or routes of march are selected before the march begins.

Personnel of from two to five noncommissioned officers and privates from the designated collecting company are transported by motor ambulances of the leading ambulance company to each of the successive collecting post sites, either by moving between the advance guard and the main body or by the use of parallel roads.

When it is desired to maintain a continuous evacuation service for such cases as will have to be sent from the division, one motor ambulance remains at each collecting post.

Stragglers. To prevent stragglers from collecting at the march collecting posts only those who have a medical emergency tag attached to their clothing or the signed permission of their organization surgeon are received, except in evident emergency.

Equipment and supplies. The equipment and supplies for a march collecting post consist of a red cross marker, litters, blankets, and such dressings as are carried on the persons of the detachment. Shelter is not ordinarily provided, but available buildings should be utilized and a red cross marker prominently displayed to mark the post by day, and at night a green lantern is so placed that its rays are not visible to aerial observation.

Upon completion of the march. Upon completion of the march the designated ambulance company following the marching column picks up the collecting post detachment, the patients, and the supplies at each post, and transports them to the bivouac of the medical regiment.

With Security Detachments. During movements in the presence of the enemy, a collecting company or a detachment thereof may be attached to an advance guard, a flank guard, or a rear guard. While so attached, the collecting company or the part thereof is under the command of the security detachment commander. In the case of a large detachment, for example an infantry regiment with supporting arms or a brigade, an entire collecting company may be attached to it.

Purpose. The purpose of the collecting company on this duty is to initiate evacuation of the aid stations to the collecting station, which may be little more than a collecting point, should the detachment become seriously engaged with the enemy. If the security detachment action leads to a general engagement, the command of the collecting company or detachment reverts to the medical commander on the order of the division commander.

Position. A collecting company or elements thereof attached to an advance or flank guard normally marches immediately in rear of the trains of the guard and in front of the ambulance company or detachment thereof. If combat is imminent, the collecting company personnel may be transported in the ambulances to the vicinity of the site where it is to establish station. In rear guards and flank guards in a retrograde movement, the order of march is reversed and the collecting company precedes the trains.

Preparation for security detachment service. Before joining a security detachment the collecting company or detachment is inspected by the company commander in order to make certain that personal and other equipment and supplies are complete and in serviceable condition, and that orders pertaining to its part in the movement are clearly understood. A copy of the security detachment commander's order should be furnished to the commanding officer of the collecting company.

If less than one collecting company is attached to a security detachment, the detachment should include all functional parts of the company in order that it may clear the field and operate an improvised collecting station.

In Combat

Introduction. In carrying out its combat duties, the collecting company forms the connecting link in the chain of evacuation between the medical regiment and the regimental medical detachments of the combat units. Ordinarily, its zone of action is that of an infantry brigade. In defensive operations the breadth of its zone of action is normally greater than in offensive operations. The greatest extension of its combat activities takes place in covering casualty collection in retrograde movements, particularly delaying action.

Evacuation of artillery aid stations. The collecting company is responsible for the evacuation of all aid stations in its zone of action, but this presupposes that the aid stations are in front of the collecting station. In general, the bearer platoons evacuate all artillery aid stations on a line with or in front of the collecting station which are inaccessible to ambulances.

Preparation for Combat. The immediate preparation of the collecting company for its arduous service functions during combat is important. Essential features of this preparation are as follows:

Any opportunities to rest the company personnel are fully utilized.

Vacancies in the company should be filled by replacement.

Special efforts should be taken to insure ample rationing of the company immediately before and during the period of combat activities.

The company equipment transportation and the personal equipment of the men are carefully inspected and checked. Missing and unserviceable items are replaced, and all of the property of the company is put into the best possible condition.

Extra blankets, dressings, litters, splints, antitetanic serum, and any other special materiel routinely evacuated with patients should be drawn in reasonable quantities.

Orders. The commanding officer receives his combat orders from or through the battalion commander. They may be formal written orders, dictated, verbal, or fragmentary in the form of written messages. See Chapter VII. The company commander's own orders are usually verbal.

Plans. The plans of the company commander should include not only his detailed plan of action for the employment of the company in combat, but routinely a plan based on a map study and such reconnaissance as he can make or has made for the forward displacement of his station, and one for the company's withdrawal during action should that become necessary. They are to be started as soon as practicable after the company is established at station. Though these preliminary plans will necessarily lack many details, they will be very valuable if the company is unexpectedly called upon to advance or withdraw when at station during combat.

Movement to Site of the Collecting Station. Immediately preceding combat the personnel of the company is moved, whenever practicable, by a designated ambulance company from its position in bivouac or column to the vicinity of the site for its collecting station or to a specified point as near thereto as the ambulance convoy can proceed. This is done not only to save time but to start the company off on its duties of casualty collection in the best possible physical condition. Such movement is made under the control of the ambulance company commander. The general location of the collecting station is determined by the medical regiment commander. The battalion commander specifies the company to operate a particular station, selects a more definite site and supervises the movement of all collecting companies to positions.

Reconnaissance. Before the company arrives at the site for its collecting station, a local reconnaissance is made by the company commander to determine the exact position for the station, local facilities, characteristic features of the terrain in the company's zone of action, and, so far as practicable, the artillery positions, infantry units in line, and the lateral boundaries within which the company is responsible for collection. If practicable, this reconnaissance is made with the battalion commander and the commanding officer of the ambulance company which is to furnish the ambulance service for the same zone of action.

Upon the completion of this reconnaissance, the collecting company commander may await his company at the site selected for the station, or he may return to his company and guide it into position.

Location of the Collecting Station. The most important factor in determining the location of a collecting station is the position of the aid stations to be evacuated. This entails a knowledge of infantry battalion boundaries and a map study or reconnaissance of the terrain approximately 500 to 2000 yards in depth in rear of the front line in the zone of action in which the station will operate. In a prepared attack or a prepared defensive position this information frequently can be obtained in advance. In a meeting engagement such advance information of units and frontages will usually not be available. In such situations it may then be best initially to order the company to a position in readiness from which it can be quickly advanced to the best position after the tactical situation has developed and the aid stations have been located.

Desirable sites: A point which intercepts the greatest number of litter routes forward to the aid stations, or the natural lines of drift of the wounded. Walking wounded tend to return to the rear by the route over which they advanced, to follow ravines and draws, and by roads and lanes if they do not pass over hills.

A site of sufficient size to permit systematic organization, shelter, or cover for the wounded while awaiting evacuation, and the movement of ambulances and trucks to and from the station. It must be on firm ground.

Near enough to the firing line to reduce to the minimum the average distance of litter carry. Depending on the terrain, the nature of the action, whether offensive or defensive, the road net and the enemy's armament, this may be expected to vary between 1500 to 3500 yards from the front line. One mile to 2000 yards may be taken as a fair average. Under favorable conditions of terrain and of enemy fire, it will sometimes be practicable to locate the station nearer the front line.

In open warfare it should be under cover from direct fire of the enemy and from normal over-shots. A distance beyond the effective range of hostile light artillery fire renders the station useless. Properly located buildings, particularly those of brick, concrete, earth, or stone construction, afford desirable sites for the station. In stabilized situations the station should have reasonable protection in cellars or dugouts. Screening against gas is then important, if gas is used by the enemy.

Near the mass of the expected casualties (area of casualty density).

Proximity to shelter and water.

Accessible from the rear to motor ambulances. The collecting station is not thus necessarily accessible at all times. Enemy fire or blown up or blocked roads may prevent ambulances from reaching the station over comparatively long periods, and in extreme situations ambulances may be able to evacuate the station only at night. For these reasons the possibility of considerable accumulations of wounded must be foreseen by the collecting company commander.

Undesirable sites: Sites which permit enemy observation and fire.

Positions so close to the firing line that the station is apt to become involved in minor fluctuations of the action.

Positions in very close proximity to bridges, fords, important crossroads, munition distributing points, artillery positions, and other points that may be subject to enemy fire.

Establishment of the Collecting Station. The establishment of all departments of the collecting station is carried out simultaneously. It is organized with the following departments: receiving, litter wounded, walking wounded, records, forwarding, kitchen, morgue, gas department (if needed), and message center. (See Plate 4.)

The platoon leader, first platoon, is responsible for establishment and equipment of the station. The platoon sergeant, first platoon, assists the platoon leader. If tentage is required, the collecting station section, reinforced by the company clerk and mechanic, pitch the tentage for the seriously and slightly wounded departments. Additional help may be obtained from the litter-bearer platoons if necessary. The kitchen is established and operated by the mess sergeant, two cooks and helpers. The message center is established and operated by a clerk (private first class). The truck drivers dig the latrines.

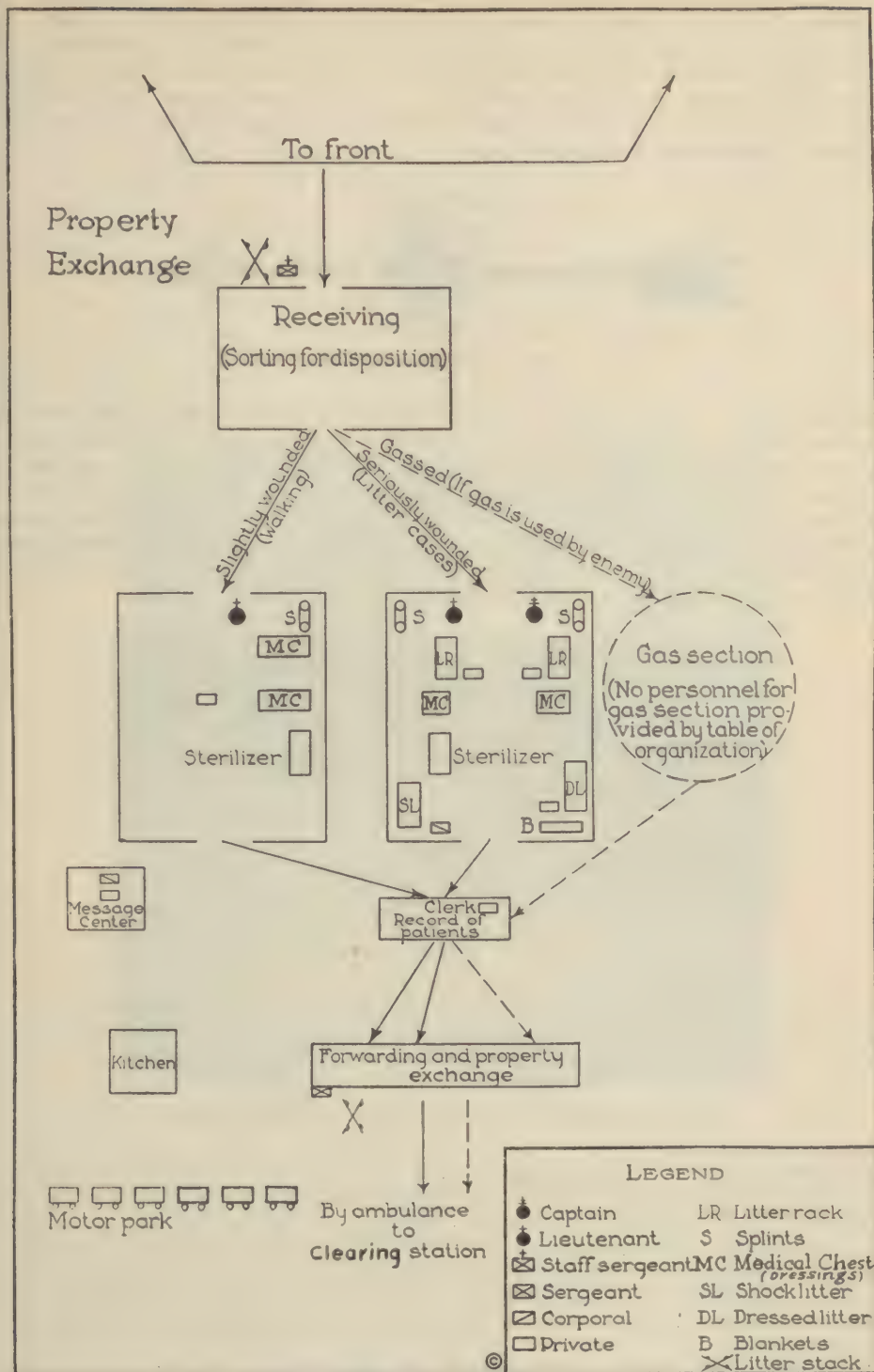


Plate 4. Conventional Ground Plan of a Collecting Station (Schematic).

In order that collecting companies may be prepared to meet the varying conditions encountered in combat without unnecessary confusion and delay, it is important that they become highly proficient in the coordinated and organized procedure of establishing the collecting station. Depending on the situation, the station is established in combat without shelter, under canvas, in buildings and cellars, or in shell-proof dugouts. If the station continues to operate several days or longer in one position, its organization, protection, and facilities for functioning are improved.

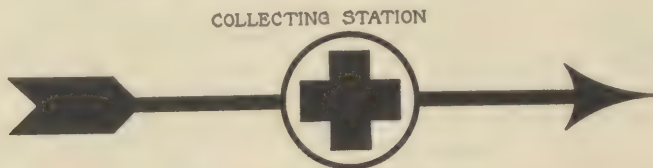


Plate 5. Directing Sign.

Directing signs. Upon establishment of the collecting station, plainly visible directing signs are posted at suitable points to mark the location of the station and the routes thereto. The area forward is adequately posted along the litter-bearer routes as far as the line of battalion aid stations. A large sign is prominently displayed in the vicinity of the station. See Plate 5. The posting and removal of the station sign are the responsibility of the platoon sergeant, first platoon. The posting and subsequent recovery of the red cross directing signs in the forward areas are the responsibility of the platoon sergeant of the bearer platoon in whose zone of action these signs are posted.



Plate 6. Receiving Department of the Collecting Station.

The message center. The collecting station, because of its well-advanced position and close contact with front-line units by litter bearers and contact agents and with the rear by means of motor ambulances, is especially adapted to the collecting and forwarding of timely and valuable information. As soon as the collecting station is completed, the motorcycle driver reports to the message center as assistant and messenger. The message center is located at or adjacent to company headquarters, out of the way of patients awaiting treatment and evacuation but convenient for the execution of its functions. It is marked by a conspicuous sign.

The message center receives and transmits only official communications. It is charged with receiving and dispatching all official communications to and from the collecting station. All messages passing through the message center are registered and recorded

in the message center register. These records are of great value in the preparation of the company war diary. They also permit the company commander to inform responsible authorities of the situation, such as: numerical list of patients received, enemy artillery activity, presence of gas, advance of troops, and other events of importance to the medical service.

Operation of the Collecting Station. The collecting station functions are conducted by the simultaneous operation of its various departments. All patients received at the collecting station are examined, sorted, given temporary treatment and hot food when indicated, and prepared for evacuation to the clearing station in motor ambulances or in walking groups. Malingers and those not needing further treatment are returned to the front, preferably under escort of the military police. No surgical operations are performed except those necessary to save life. In general, treatment consists of the application and adjustment of splints and dressings and the treatment of shock.

Receiving department. In the receiving department the patients are divided into two groups—seriously wounded (litter cases) and slightly wounded (walking wounded). While at the station these two general groups are kept separated. Roughly, about 50 per cent. will be classified and grouped in each class.



Plate 7. Patients Arriving at the Receiving Department.
Note sergeant inspecting the E. M. T. of the litter case.

The permanent personnel of the department is the platoon sergeant. All patients are received here. Each casualty is examined (Plate 7) and, after determining the nature and severity of the wound or other lesion, either by direct examination or by examination of the emergency medical tag, the patient is sent at once to the walking wounded department, to the litter wounded department, or to the gas department. A supply of blankets, litters, and arm and leg splints are placed nearby for property exchange.

Litter wounded department. (See Plate 8.) The purpose of all treatment here is to prepare the patient for evacuation in the best possible condition. However, all treatment at the collecting station is necessarily based on the greatest good to the largest number. A large percentage of the patients will have been dressed previously at the aid stations or on the field, but, owing to the unfavorable conditions under which these dressings are often made, many dressings must be adjusted and many others reapplied at the collecting station.

The *personnel* (minimum) for this department consists of two medical officers (one of them is the company commander), one corporal (section leader) in charge, one technician in charge of sterilization and administration of antitetanic serum and hypodermic medication, one technician in charge of shock litter, one private in charge of dressed litters,

and two privates (technicians) as assistants to the medical officers. Each officer takes charge of an improvised operating table, generally consisting of a litter mounted on medical chests or other supports. Dressings and splints are conveniently placed for use. All patients are examined and dressed or redressed as necessary. Only the simplest and most necessary operative procedures are undertaken. Tourniquets found on patients are removed.



Plate 8. Litter Wounded Department.

Working to the rear of the operating tables is the surgical technician charged with the duty of sterilizing instruments and the administration of antitetanic serum and hypodermic medication. An important duty of this man is to examine the emergency medical tag of each patient and, if antitetanic serum administration is routine, to determine whether



Plate 9. Shock Litters Arranged in a Group.

or not it has been given. If it has not been given, he administers the prescribed dose and makes a notation to that effect on the E. M. T.

A section of the litter wounded department is necessary for the treatment of traumatic shock. Located conveniently are what are known as shock litters, operated by a technician.

On the ground under the shock litters may be placed lanterns which, when lighted, furnish sufficient heat to thoroughly warm a patient placed on the litter. The heat is best increased by blanketing the patient and by the judicious placing of rubber bags or canteens filled with hot water. Shock litters may be grouped as shown in Plate 9. In this instance, hot water bottles and canteens filled with hot water are used instead of lanterns. The head is kept lowered until the patient is relieved from shock.

One private is detailed to *dress litters* and to produce one quickly when it is needed. A litter is said to be dressed when blankets have been arranged upon it as follows (FM 8-35): Place the first blanket on the litter lengthwise so that its edge corresponds to one pole of the litter and fold it back upon itself. Place the second blanket lengthwise upon the litter so that its edge corresponds to the opposite pole of the litter and fold it back upon itself once. Place the third blanket folded once lengthwise upon the other blankets. The patient is placed upon the litter on the double folds of the first two blankets. The third blanket, folded once, is placed over the patient, and the free edges of the two other blankets are brought up over the third blanket. In this manner three blankets are made to provide four layers under the patient and four layers over him.

Walking wounded department. This department is operated by a medical officer (from one of the bearer platoons) assisted by a specially trained corporal and three technicians. Hypodermic medication and the administration of antitetanic serum are handled as described above for the litter wounded department. All walking or slightly wounded casualties are treated in this department.

Record department. The clerk maintains a record of patients. He keeps a numerical record of all patients received at the collecting station, classified as indicated on the report form below. This report is submitted through the message center to battalion headquarters at such intervals as may be directed by the regimental commander, usually every 4, 6, or 12 hours, depending on the situation.

Numerical Report of Casualties (collecting stations)

From: _____ collecting company, at _____ (place).

To: _____

Period (____AM) _____ (day) (____AM) _____ (day) _____ (month) _____ (year).
(____PM) _____ (day) (____PM) _____

Classification	Officers ¹	Enlisted	Adjacent divisions	Prisoners	Others	Aggregate
Seriously wounded						
Slightly wounded						
Gassed						
Sick						
Died at collecting station						
Returned to organization						
Total						

¹ Name, rank, and organization of officers to be listed below.

Forwarding department. This department is operated by the company supply sergeant. When a patient's treatment is completed he is sent or moved to the forwarding department. Here also the seriously wounded and the slightly wounded are kept separate, although in close enough proximity that the forwarding sergeant can control the movement of all patients. While awaiting evacuation, patients, especially the seriously ill and wounded, are provided with shelter whenever possible, if the weather is cold or inclement.

The forwarding sergeant directs the *loading of ambulances*, checks the *exchange of blankets, splints, and litters* brought forward by the ambulances, and *classifies patients* for evacuation as follows:

Those who must be transported recumbent.

Those who may be transported sitting.

Those who must be transported apart from others (gassed and contagious diseases).

Equipment and personal belongings of the wounded may accompany them to the clearing station, or salvage dumps for these items may be established at each collecting station, depending on the instructions of the division commander.

To prevent the rapid exhaustion of blankets, litters, and splints, and of any other special material evacuated with patients, the forwarding sergeant will see that each ambulance removing patients from the collecting station replaces all the above items in each case. This is known as the *blanket, litter, and splint exchange*.

Stragglers, trivial casualties, and malingerers may be returned in different ways to the front: by military police stationed at the collecting station, by turning them over to military police on the straggler line, or by a guard detailed from a combat unit.

Kitchen. When the station is opened, the cooks immediately prepare an adequate supply of hot coffee, cocoa, or soup. While the patients are awaiting treatment and evacuation, they are given nourishment by the kitchen personnel.

Morgue. This is merely a designated place out of sight of the wounded where those who die at the station are placed until they can be properly buried or removed by those responsible for their burial.

Gas department. If gas is used by the enemy, provisions must be made at a collecting station for gassed cases. They should not be mixed with other patients. Therefore, a separate gas section of the station is formed. Gas casualties and suspected gas casualties upon arrival at the station are diverted to the gas section. See Plate 4. While these cases must receive treatment at the collecting station, the meager equipment and limited personnel at the station prevent more than the minimum of ameliorative measures. Degassing of mustard-gas and suspected mustard-gas cases is carried out if practicable. In good weather, gas casualties are best handled and treated in the open. The personnel caring for mustard-gas cases must wear masks and the special protecting suits and gauntlets provided for this purpose.

This section is organized and operated on the same principles as other departments of the station. The necessary classification of cases, according to degree of injury and kinds of gas, is made.

Present Tables of Organization provide no personnel for the operation of the gas section. When needed, specially trained personnel and suitable equipment must be added to the collecting company for this duty.

The Liaison Section. Responsibility for contact and communications is normally from rear to front. Although regimental and battalion surgeons, when necessary and practicable, may properly send agents back to the collecting station to inform the commanding officer of the collecting company where their aid stations are located, the responsibility for the establishment and maintenance of this contact remains with the collecting company.

Contact agents. The basic duties of the contact agents are:

To locate all aid stations in the collecting company's assigned area (usually not assigned to artillery units).

To return to the collecting station and guide the litter bearers forward to the aid stations.

To then remain at their respective aid stations and there act as contact or liaison agents for their collecting company, sending back to the collecting company commander all the useful information they can obtain.

Contact agents may be first dispatched on their mission immediately after the arrival of the company at the collecting station site or before arrival at the site for the collecting station and some time prior to the beginning of combat. In prepared attacks, in general, and in some meeting engagements, the second procedure can be adopted. The decision as to which method will be used must be made by the company commander in accordance with each special situation. Instructions to contact agents must include the following:

Direction of the enemy.

Boundaries of the zone of responsibility of the collecting unit—shown both on the ground and on the map.

Designation of the unit, or units, to which the contact agent is being sent.

Location of such unit, or units, if known.

General route to be followed.

Any information to be transmitted to the regimental or battalion surgeon to whom the contact agent will report, such as the location of the collecting station and when litter squads may be expected to arrive at the aid station.

When two or more contact agents are being dispatched to a combat regiment, all should report initially to the regimental surgeon so that he may distribute them according to the plans for the employment of the combat regiment.

If a contact agent sent to locate an aid station does not report back to the collecting station at the proper time, the commander may send out another contact agent, the sergeant of the communication section, a noncommissioned officer from one of the bearer platoons, or the bearer section or platoon designated to clear that aid station, according to the situation.

The agencies of communication available to contact agents for transmitting their information to the collecting station are usually limited to returning litter bearers, walking wounded (unreliable, but used when necessary), ambulances arriving at the aid station or a near-by advanced ambulance loading post, and the telephone, when available.

Messages of special importance are sent in duplicate by two different agents. One message is marked "Duplicate." Sketches are sent when they supplement a written message, or when they better explain a certain situation than does a message. Each contact agent is provided with a field message book.

The Litter Bearer Platoons. For the organization of the second and third platoons of the collecting company see Chapter II. The litter bearer platoons are responsible for the evacuation of all aid stations in the collecting company's zone of action. The assembling of litter cases at the collecting station is a slow procedure, and the time required to clear the field of many wounded is considerable. A litter bearer squad of four bearers ordinarily accomplishes quicker evacuation than smaller squads because the labor involved under combat conditions is exhausting. Two-bearer squads are efficient only for a few hours and then only when the litter carry is short. Assuming that the average distance between the collecting station and aid stations is 1200 yards, a bearer squad will require an hour per round trip. Using four-bearer squads, a platoon at this rate will evacuate only eight litter cases per hour. However, the time actually required is dependent on so many factors peculiar to each situation that no accurate rule can be given. Some of these are: night collection, casualties scattered over the field instead of being assembled at aid stations, inclement weather, difficult terrain (mud, rough, undergrowth, etc.), enemy fire and gas, enemy counterattacks, long litter carriage, fatigue of litter bearers, casualties sustained by litter bearers.

Some of the practicable means of reducing the time of collection are as follows:

Use of wheeled litter carriers. See Plate 10.

Reinforcement of bearer platoons from a reserve collecting company.

Reinforcement of bearer platoons from medical units of higher echelons.

Reinforcement of bearer platoons by other troops (Division commander).

Use of ambulance loading posts in advance of the collecting station.

Forward displacement of the collecting station.

Leapfrogging by another collecting company.

Use of prisoners of war.

Use of narrow-gauge or light railways.

Advance ambulance loading posts. See the "Ambulance Shuttle" discussed under "Ambulance Company."

Litter bearers. Litter bearers are usually not displaced until the locations of the aid stations are definitely known. The formation in the advance to the aid stations must be such as will be the least casualty producing to the litter bearers. When the aid station is reached, evacuation begins at once, all litter cases being carried back to a litter relay post, the collecting station, or to an advanced ambulance loading post. When, in addition to removing the wounded from aid stations, the bearer platoons must also search and clear the field or certain areas of it, their work is greatly augmented and collection is

retarded. If casualties are numerous, reinforcements are then necessary. Similar difficulties ensue during dark nights, especially on strange terrain.

Litter relay posts are established as required, usually about every 600 yards. Over good terrain the distance between relay posts can be increased several hundred yards. The relay posts are on the litter bearer routes which extend from the aid station back to the collecting station or to some other point at which wheeled litter carriers, light railway, or ambulances can take over the patient.

The points selected, so far as practicable, for litter relay posts are so spaced that all bearers in the chain of evacuation are kept approximately equally occupied. The relay posts should be definitely organized, affording shelter during inclement weather, some security from hostile fire, a small reserve of blankets, litters, and splints, and a place for storing food. Frequently shell holes, dugouts, or trenches can be used. The strength of a relay post may be a half section, a section, and occasionally as many as 24 bearers.

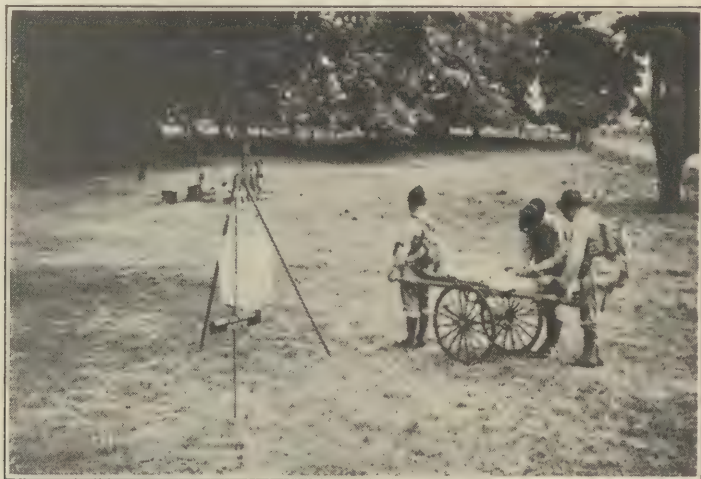


Plate 10. Patient on Wheeled Litter Carrier Arriving at the Collecting Station.

The operation of the relay posts is simple. Posts are numbered from front to rear. A bearer squad with patient arrives from an aid station at post No. 1, turns its patient over to a bearer squad at post No. 1 without removing him from the litter, takes a litter from the stack, and returns at once to the aid station. In the meantime, a bearer squad from post No. 1 carries the patient to relay post No. 2 or to the collecting station, as the case may be. The organization of the relay post system varies according to the situation. One line of relay posts may be established to each aid station being evacuated, all converging at the collecting station; or, as is more frequently the case, especially if the front is not wide, the chain may run forward to No. 1 post, which is centrally located in the rear of and close to the aid stations, and all wounded are evacuated from the aid stations to No. 1 relay post, and thence back through the relay route. Each situation must be studied with a view to the simplest, most rapid, and economical removal of litter patients from the aid station to the collecting station.

Wheeled litter carriers (See Plate 10) are utilized wherever the ground is smooth enough for their employment. Those of the collecting company may be assigned to one bearer platoon or divided between the two platoons, depending on the distances to the several aid stations. Wheeled litter-carrier relay posts should not be located as close together as litter relay posts. Each wheeled litter carrier is operated by two men.

Litter bearer platoon leader. This officer, under the company commander, is responsible for organizing and operating the litter bearer service during combat. When necessary, he leads the bearer platoons forward (usually in column of litter squads) and makes the initial dispositions. He establishes his command post normally at the collecting

station or at a litter relay post from which he can best control and coordinate collection in the company zone of action. He goes, however, wherever his services may be required. He informs the platoon sergeants of his position and keeps in communication with them. He keeps the company commander constantly informed of the situation and makes timely requests for reinforcements or relief of his bearer platoons.

The *platoon sergeant* receives his orders during combat from the platoon leader. He goes forward with his sections and personally sees that they reach the aid station or stations, or other objective, and gets evacuation under way at once. He organizes litter relay posts as directed and supervises the work of his platoon. He takes post at a point from which he can best control the functioning of his platoon. This may be at a relay post or a point where the evacuation routes of his sections converge. He maintains close contact with the section leaders at all times and keeps his commanding officer constantly informed of the situation in his platoon and zone of action.

Displacement of the Collecting Station. The collecting company must maintain close contact with aid stations in order to keep the length of litter carry at the minimum and to make effective evacuation of aid stations. When the company commander believes that the station should be moved in order to maintain effective contact he moves it if he has been given the authority to do so, and reports his action to the battalion commander. If he does not have this authority, he makes prompt recommendation to the battalion commander. This implies that the company commander must keep in touch with the conditions on his front and must make such reconnaissance and plans as will enable him quickly to advance or withdraw the station should the developments of the action make it necessary. Ordinarily a station is not moved without orders from the battalion commander.

The company commander, accompanied if possible by the ambulance company commander concerned, makes a reconnaissance of the route or routes forward and of the vicinity in which the collecting station is to be reopened.

The officer directing the company litter bearer service is informed of the new location for the station and the hour at which the movement of patients thereto is to start. He explains the situation to his platoon sergeants and regroups his bearer service to meet the new situation.

Medical supplies are replenished as necessary. Battalion surgeons are notified by field messages of the location of the new collecting station and when it will open.

The station is cleared of its accumulated wounded. Equipment and supplies are packed and loaded. The advance to the new site is made at the hour and by the route prescribed in the order from the battalion. The collecting battalion commander is informed as soon as the new station is opened.

Ordinarily, one truck and the equipment and personnel of the slightly wounded department should remain at the old site until everyone concerned has been notified of the movement forward and the establishment of the new station.

Relief of Collecting Companies at Station. When a collecting company at station is to be relieved, the battalion commander issues the necessary orders, designating the company for the relief (if it is to be from his battalion), the date and hour the relief is to be completed, route by which the relieving company will approach the station, and the elements of the old company to remain in the area for the guidance of the new company. When necessary, guides are detailed to meet the new company. This is especially necessary in night reliefs.

Upon receipt of the order, the company commander of the relieving company, or an officer designated by him, proceeds to the company he is to relieve for arrangement of details and a thorough reconnaissance of the entire area covered by the company he is relieving. He takes over all maps of the area and all property which is to be exchanged. He familiarizes himself with all orders. He must note especially the following important points:

Location of all aid stations and the routes thereto.

Location of each relay post and advanced ambulance loading posts (if any).

Wheeled litter-carrier routes.

Location of the ambulance station.

Source of water supply and purity of the water.

Source of fuel.

Characteristics of enemy artillery fire and his habits relative to the use of gas.

Areas which come under enemy observation.

The relief of the litter bearers conforms to the principles governing such operations. No relief should be carried out without leaving important elements of each section being relieved in position to aid the incoming bearer platoons during the first few hours. The men so left are used in giving information as to the area and in guiding groups from place to place until the new personnel is thoroughly familiar with the terrain and the peculiarities of the enemy artillery on this portion of the front.

Division of the Company for Tactical Employment. The collecting station equipment is so made up and carried that the company can be divided into two approximately equal parts, each one of which is able to function on a limited scale as a collecting company in combat.

Occasions may arise when such a division of the company is desirable or necessary, as in the following situations:

With a force on a detached mission which does not require a complete collecting company or for which a complete company cannot be spared.

When a force is fighting on an extended front against a weak enemy, in a delaying action, or is holding defensively a wide front.

When one or more terrain features divide the brigade zone of action into two zones more or less inaccessible to each other.

When only part of a collecting company is required for security detachment.

The company is so divided that each half contains its proportionate share of officers, equipment, and the functioning sub-units of the company. Modifications of this assignment can be made to meet special situations. A detachment containing the necessary personnel, transportation, and equipment for the operation of a separate and additional collecting station might be as follows:

One sergeant, one private, and truck driver.

First platoon less first section leader and two contact agents.

Third platoon.

Truck containing one unit of collecting station equipment, complete.

In Retrograde Movements. The successful operation of the collecting company in withdrawals and retirements is difficult. Its management is dependent on many indeterminate factors beyond the control of the division surgeon, and even of the division commander. The mission of the collecting company is difficult; abandon no sick and wounded.

Rapid, forced retirements. In a retirement characterized by long daily marches, slight and intermittent contact with the enemy, and small battle losses, the service demands on the collecting company are comparatively small in themselves, consisting chiefly of sick, march, and security detachment casualties. The problem is greatly complicated by the rapidity of the movement, congested roads, lack of communications and orders, and the confusion and uncertainty that are almost inevitably present. The prime difficulty lies not so much in assembling the casualties at collecting stations as in getting them evacuated, because of the inability to get ambulances up to them through the marching troops and trains and of getting back through the troops and trains with the wounded.

Rear guard casualties. The collecting company usually marches between the tail of the main body and the rear guard. A collecting station is established relatively close to the firing line and at a point favorable to rapid ambulance evacuation. If the rear guard action results in heavy fighting, the collecting company detailed to this duty should be reinforced by the bearer platoons of one of the other collecting companies; these occupy an insignificant amount of road space and are invaluable in rapidly collecting the wounded who are apt to be scattered over a comparatively wide front. In a delaying action on a wide front a second collecting point accessible to ambulances hastens collection. The collecting station should be simple in its equipment and organization and capable of being closed and loaded in a few minutes. Its greatest value, in rear guard actions generally, is as a collecting point. The collecting company commander must be kept informed of

the situation as far as it is known to the commander of the rear guard and of the latter's plans.

Preparations for the rapid withdrawal of the collecting station or points should be made by the reconnaissance of routes to the rear and the selection of new station sites, to one of which the company can be withdrawn. The principles and procedure for the rearward displacement of a collecting company are analogous to those for its forward displacement. A collecting company at station may be relieved by the establishment of another company at station at a selected point in its rear.

March casualty collection. In a rapid retirement the establishment of march collecting posts along the route or routes of march is generally indicated to a greater degree than in an advance. March collecting posts serve not only as points for taking over sick and crippled in excess of the capacity of the ambulances attached to the several marching organizations, but also as assembly and information points for stragglers and those who have lost their commands. In a retirement they can always be established in advance of the marching columns. To increase their mobility their equipment and personnel is reduced to the minimum. They are evacuated by a motor ambulance company or detachment thereof following the main body, by supply and ammunition trucks, and in cases of necessity by impressed transport.

Withdrawals. Withdrawals characterized by strong and effective resistance throughout the movement have the great disadvantage of having many more battle casualties to handle than in a retirement mentioned above. However, the materially slower retrograde movement compensates for this extra demand.

The collecting stations should be established comparatively well back from the firing line in order to give them more permanency. All available litter bearers are used, and bearers are supplemented by ambulances which advance up to aid stations wherever practicable and, when this cannot be done, up to advanced loading posts where litter cases are transferred to them. Continuous contact with front-line units is difficult but must be maintained; otherwise, collections of wounded at certain aid stations will be overlooked until it is too late to remove them. There must be the closest coordination and cooperation between the collecting company and the ambulance company covering the same zone of action.

Rearward displacement or relief by another collecting company at station in rear must be given early consideration in order that the medical service will be adequate, well organized, and well directed.

Medical Supplies for the Collecting Company. Medical supplies are obtained on informal request to the division medical supply officer as needed and are delivered at the collecting station by ambulances returning from the clearing station or by the trucks of the Headquarters and Service Company.

Requests passing through the collecting station from the medical detachments of the combat units should, as a general policy, be filled at once by the collecting company commander and dispatched forward without delay by his litter bearers. The requests are then sent back to the division medical distributing point with a note on each stating the action taken at the collecting station. The medical supply officer immediately replaces the items for the collecting company.

EMPLOYMENT OF THE AMBULANCE COMPANY

Introduction. The ambulance company is an integral part of the ambulance battalion. See "Organization of the 2d Battalion (Ambulance)," Chapter II. Its employment rests with the battalion commander, subject to the orders of the regimental commander. When an ambulance company or a detachment thereof is attached to a security detachment or a detached force, the command thereof while so attached, passes with it.

In Camp

In large camps or bivouacs the ambulance service is usually operated by a designated ambulance company. Ambulances follow a prescribed route, visit the organization dispensaries shortly after sick call, collect the sick, and transport them to the hospital.

On the March

Ambulance companies, less released detachments, usually march with other elements of the medical regiment. See Order of March, Employment of the Medical Regiment, above.

Detachments with Marching Troops. Casualties of the march are usually handled by attaching an ambulance to each infantry battalion, artillery regiment, engineer combat regiment, or equivalent unit.

Detachments with Security Detachments. When ambulances are used with a security detachment their use is dependent upon the tactical situation. See retrograde movements below. When ambulances are used in an advance guard, they move by short runs between the tail of the advance guard and the head of the main body.

Readiness for detachment. Before joining a security detachment or detached force, the ambulance company or detachment is inspected. The company commander ascertains that personnel, equipment, and transportation is satisfactory for service, sees that the necessary arrangements have been made for coordination with the collecting company attached to the force, and that the orders pertaining to the ambulance company's part in the movement are fully understood. A copy of the order of the commander of the unit to which attached should be furnished the ambulance commander.

March Collecting Posts. See paragraph "March Collection of Casualties, Employment of the Medical Regiment," above, as to the indications for and operation of march collecting posts.

Sufficient ambulances from a designated company are directed to transport the personnel of the collecting company to the sites of the march collecting posts. They precede the main body and drop the collecting company personnel at the points selected. If considered advisable, an ambulance may remain at each post to evacuate any emergency cases to the hospital station.

The remainder of the company follows the main body, picks up the collecting company detachments and any patients remaining at the collecting posts, and transports them to the next bivouac.

All patients should be taken to the hospital station for treatment. Those not requiring hospitalization are delivered to their organizations. Upon completion of this duty these ambulances join their company at its bivouac.

When practicable, it is desirable that ambulances carrying patients and personnel of collecting posts take cross and parallel roads rather than follow the marching column. The availability of roads to ambulances should be definitely stated in orders to the ambulance company.

In Combat

The *principal functions* of the ambulance company in combat are as follows:

The transportation of casualties from collecting stations and, when opportunity presents, from regimental and battalion aid stations or other advanced loading posts to the hospital station; also the movement of non-transportable cases to the surgical hospital when the latter is located in the vicinity of the hospital station.

Secondary functions are the transmission of messages along the ambulance routes and the forward transportation of medical personnel and supplies.

Relations with the Collecting Company. The ambulance company operates in close cooperation with the collecting company serving in the same zone of action. The ambulance company adapts its dispositions to those of the collecting company, rather than the reverse, except as noted below:

The collecting station is established at or near a point accessible from the rear to ambulances. Local conditions may prevent the approach of ambulances to the station over periods of several hours. On account of enemy activity it may be impracticable to reach some collecting stations except at night.

To facilitate casualty collection, ambulances should be employed in front of the collecting station when practicable.

Evacuation of aid stations in rear of the collecting station. Artillery and other aid stations located in rear of the collecting station are evacuated by ambulance direct to the clearing station when practicable.

Transportation of collecting companies. The ambulance company, if practicable, transports the marching personnel of the collecting company which is to operate in the same zone of action to the vicinity of the site selected for its collecting station, or as near thereto as the situation permits. Entrucking and detrucking and the movement to the detrucking point are under the control of the ambulance commander.

Orders. The company commander receives his orders from or through the 2d Battalion (Ambulance) commander. These should include the roads or routes available to ambulances. The ambulance company commander's own combat orders will usually be oral.

Plans. In addition to a plan of action for the existing situation, the company commander should, as a matter of routine, prepare a plan for possible changes in the situation, such as a forward movement or a retrograde movement.

Preparation for Advance to Combat Positions. Upon receipt of a warning order, the company commander issues the necessary instructions for the preparation of his company, makes a map study of the road net in his zone of action (usually a brigade) from the area selected for the clearing station to the front line, and confers if possible with the commander of the collecting company whose personnel he is to transport.

While the company is moving forward the commander makes a reconnaissance of the area in which his ambulances are to operate, or as much of it as is necessary and time will permit. The company commander usually accompanies the battalion commander on the latter's reconnaissance and when practicable visits the proposed site for the collecting station in company with the respective collecting company commander.

Important features of reconnaissance. Condition of the roads on available or assigned ambulance routes.

Dominant terrain features as they will probably affect dispositions and operation of the company.

Notation of friendly artillery positions so far as they will affect the dispositions and employment of the company.

Local facilities in the way of buildings and matériel that may be utilized.

Whether the site selected for the collecting station is accessible to ambulances, probable cover that it will afford, adequacy of space for ambulances and their movements, and whether the ground is firm enough for ambulances.

Suitable positions for ambulance relay posts, loading posts, and ambulance traffic posts.

Upon completion of this reconnaissance, the company commander should have his detailed plan of action worked out for the advance of his company, the establishment of the ambulance station and shuttle system, the use of alternate routes if necessary, and for the initiation of casualty evacuation.

The orders for the advance to combat position or positions in readiness should prescribe the time the movement is to begin or to be completed, the route, the collecting company (if any) which it is to transport, the points at which the collecting company is to be entrucked and detrucked, and any other necessary directions.

The Ambulance Station. The ambulance station is the place at which the administration and operation of the company in combat are conducted. It includes the command post, message center, mess, transportation for company headquarters, principal group of ambulances, and facilities for making minor repairs to transportation. Ordinarily, ambulances are echeloned forward from the ambulance station to the collecting station.

Location. Because of the ambulance company's flexibility in operation, the ambulance station is usually located a mile and one-half to two miles in rear of the collecting station which it evacuates and on the ambulance route to the hospital station. It should be placed beyond the range of hostile auxiliary infantry weapons and have reasonable protection from light artillery fire. Concealment from hostile aerial and ground observation is desired. There should be firm ground for the parking of ambulances.

Undesirable locations are those near munitions, distributing points, bridges, artillery positions, important crossroads, and other objectives against which hostile artillery fire and bombing are apt to be directed. Exposed positions are to be avoided.

Establishment. Upon the arrival of the company at the selected ambulance station site the transportation is temporarily parked at the side of the road. The captain assembles

and points out to the junior officers and the noncommissioned officers the locations for company headquarters, message center, kitchen, latrines, motor park, and shelter tents, and issues orders for the establishment of the station.

A junior officer is directed to proceed with a designated number of ambulances and to establish the ambulance shuttle.

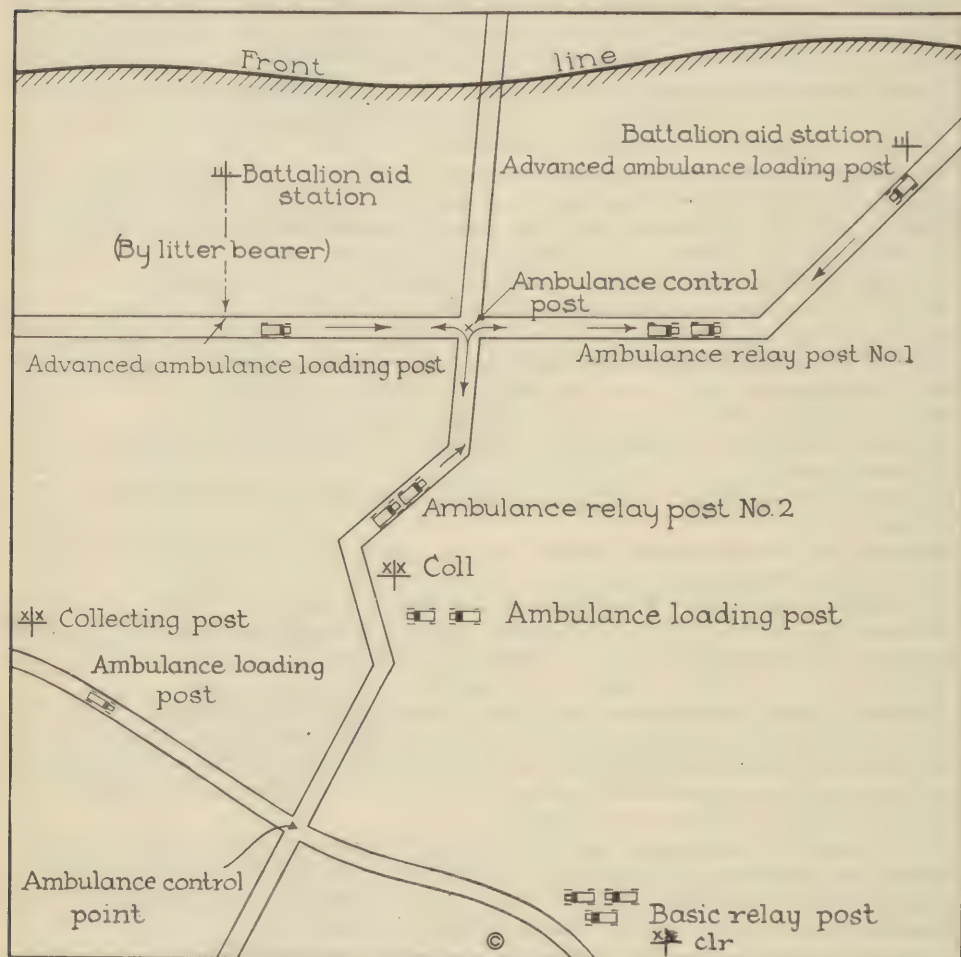


Plate 11. The Ambulance Shuttle (Schematic).

The message center. A message center accessible to passing ambulances is operated by the company clerk. Messages from or to the company are dispatched, received, and recorded. Those being carried by ambulance drivers or orderlies for other units are examined to determine destination and are returned to the bearer without recording. The clerk also keeps the "log," which forms the basis of the periodical operation reports to the battalion commander and in which are recorded the number of patients transported as follows:

Number of lying and sitting patients.

Number of the ambulance.

Name of the driver.

The hour ambulance checks in at station en route to and from the clearing station.

Messing. All personnel are messed from the ambulance station when practicable. As the personnel is scattered, the company may be divided into reliefs for messing, or lunches

may be distributed. Company personnel at or in front of the collecting station and at the clearing stations messes at those stations.

Directing signs. The following directing signs are posted: Ambulance Station No.—, Message Center, Motor Park, Amb. Relay Post No.—, Amb. Loading Post, Amb. Traffic Post.

Motor maintenance. See Chapter XII, Part I.

The Ambulance Shuttle. The shuttle system is a flexible method of employing ambulances during combat in the evacuation of collecting stations or other loading points. It consists of one or more ambulance loading posts, one or more ambulance relay posts, and, when necessary, one or more ambulance traffic posts, all echeloned forward from the principal group of ambulances (*the basic relay post*). The latter consists of those ambulances at the ambulance station not in company reserve.

Ambulance loading post. This is a point in the shuttle where one or more ambulances are stationed ready to receive patients for transportation.

Advance ambulance loading posts. Ambulance loading posts in front of the collecting station are used as circumstances permit. The application of this procedure, however, is generally limited by the military situation. In some situations ambulances can reach aid stations at night when this is impossible during the day. Whether ambulances shall be employed or not in front of collecting stations and when they shall be so used are determined by the ambulance company commander and higher authority. Wounded collected at advanced ambulance loading posts are generally more economically transported directly to the clearing station than through the collecting station.

Ambulance relay post. This is a point in the shuttle where one or more empty ambulances are stationed ready to advance to a loading post or to the next relay post to replace an ambulance that has moved from it. Relay posts are numbered from front to rear. Plate 11 shows an advanced ambulance shuttle evacuating battalion aid stations.

Ambulance control post. This post consists of a noncommissioned officer or private from the ambulance company, stationed at a crossroad or road junction where ambulances must take one of two or more directions to reach loading posts. This soldier, knowing from which post each loaded ambulance has come, directs empty ambulances coming from the rear. Control posts are more frequently required in advance shuttles than in the main shuttle. (See Plate 11.)

Establishment of the shuttle. Upon arrival at the point previously selected for the relay post nearest the ambulance station, the party designated to establish the ambulance shuttle drops from the column of ambulances the requisite number of ambulances. This is repeated at successive relay posts until the loading post at the collecting station is reached. The tactical situation may prevent these ambulances from advancing to positions in close column. A noncommissioned officer should be stationed at important relay and traffic control posts and at the collecting station. A noncommissioned officer is also stationed at the hospital station. The duties of the noncommissioned officers at these stations are:

To oversee the ambulance service at these points.

To supervise the blanket, litter, and splint exchange.

To see that messages and medical supplies to be forwarded by ambulances are expedited.

Advantages of the shuttle system. This system places ambulances at the collecting station at the rate at which they are loaded and dispatched.

It permits a steady flow of patients through the collecting station to the clearing station.

It avoids the unnecessary massing of transport in the forward areas.

It minimizes the danger of damage to ambulances by the enemy.

It permits the commanding officer to control his company, enables him to extend its activity without advancing the ambulance station, and affords a reserve which is easily manipulated.

It facilitates administration and maintenance during combat by withdrawing these activities farther from the front.

It permits the use of sections or platoons as necessary to operate the shuttle without employment of the entire company. The remaining ambulances may then be used for specific calls or be used in convoy for particular situations.

Forwarding Medical Supplies. The ambulance company is used as an agency during combat to forward medical supplies required for current replacement by the collecting company and aid stations in its zone of action. Drivers deliver messages (informal requests) asking for supplies to the clearing station message center. The request is then delivered to the Headquarters and Service Company which furnishes the supplies. These supplies when assembled are forwarded on the next returning ambulance which, on reaching the ambulance station, transfers them to the first ambulance moving forward from that station. This is repeated at each subsequent relay post until the supplies reach the collecting station. It is occasionally possible to deliver medical supplies direct to aid stations. Ambulances normally are not diverted from their prescribed routes for the delivery of supplies. This method of forwarding medical supplies is only used when the Headquarters and Service Company cannot transport the supplies in its own vehicles.

Transmission of Messages. It is the responsibility of noncommissioned officers and drivers to see that all messages entrusted to them are delivered with no unnecessary delays. Messages must be transferred from the driver first receiving them to the first driver moving out from the ambulance station or relay posts. The man in charge of an ambulance traffic post examines all messages carried by ambulances arriving at his post from the rear. If necessary, he holds the message until an ambulance passes his post going to the point addressed. Ambulances are not diverted from their prescribed routes for the transmission of messages.

Forward Displacement of the Ambulance Company. Advances of the collecting station not exceeding a mile or two are generally met by extending the ambulance shuttle forward without changing the ambulance station. Advances beyond this distance usually demand a forward displacement of the ambulance station.

The company commander, accompanied if practicable by the collecting company commander, makes a reconnaissance of the route or routes forward to the new site selected for the collecting station. He then works out his detailed plan of operation for the new situation.

The evacuation of the old collecting station is completed, ambulances being temporarily left for this purpose if necessary. The ambulance station is closed. The company advances as prescribed in the battalion commander's order, and the commander is informed as soon as the new station is established. Ambulances at relay posts join the company as it passes forward.

Relieving the Ambulance Company. When an ambulance company at station is to be relieved, the commanding officer of the relieving company, accompanied by the commander to be relieved, makes a reconnaissance and especially notes the location of all relay and loading posts, routes, condition of roads, stretches of road under enemy observation, characteristics of the enemy fire and his habits relative to the use of bombs and gas, the sources of fuel, water, and gasoline. Local orders and maps are transferred. The relief is effected at the time and by the routes prescribed in orders.

Retrograde Movements. In retrograde movements the immediate problem confronting the ambulance company commander is to evacuate the greatest possible number of casualties in the shortest possible time. This is accomplished by:

Close cooperation and support of the collecting company with which associated.

Advancing ambulances to aid stations; when this is impracticable, to collecting points in front of the collecting station where the patients are taken over from litter bearers.

Supplementing evacuation from the collecting station with trucks when available, using, temporarily, as many ambulances as may be necessary in the forward area.

Transporting the wounded only a comparatively short distance from the front line, not more than six to ten miles, either to a clearing station or to an entrucking point where they are transferred to army ambulances, trucks, or other available vehicles for transportation to an evacuation hospital.

The use of a return route to the front as free as possible from withdrawing troops and trains.

An ambulance company finally withdrawing should carry patients to its full capacity.

Night withdrawal. Ambulances are allotted in proportion, roughly one ambulance company per brigade. At dark, ambulances are advanced as far ahead of the collecting stations as the situation permits, to reduce hand litter carry. Ambulances are usually assigned singly to battalions on the march to the new position. If ambulances are not available in sufficient numbers, march collecting posts are established. Whenever possible, ambulances will transport collecting company personnel to its new position.

Daylight withdrawal. Ambulances are assigned to support the action and the withdrawal of covering forces. The size of the unit assigned depends upon the size of the covering force. Wounded left by covering forces will be difficult to save. Whenever possible, ambulances will evacuate the wounded at collecting points. With the main body, ambulances are distributed as on a march.



Plate 12. Head of the Ambulance Column.

Delaying action. The ambulance company assigns sufficient ambulances to support the covering force or forces. Ambulances should be used to the fullest extent practicable in front of the collecting station or collecting points. The support of the withdrawing elements will conform in general to the methods described for day and night withdrawals, above. When flank security detachments are used, ambulances will be assigned according to their strength and employment. When a stubborn defense of a delaying position is undertaken, the ambulance company is employed as in a defense. Ambulance stations are established well to the rear of the collecting station, thus permitting that station to fall back without withdrawing the ambulance station. The ambulance shuttle is then shortened to conform to the new collecting station.

Retirement. Ambulance service is provided for the covering force or rear guard as in withdrawals. March collection is provided for the main bodies as described under marches. The ambulance company generally marches between the main body and rear guard prepared to support the action of the rear guard. Evacuation is accomplished by parallel roads or at time of halts on the main troop roads.

EMPLOYMENT OF THE CLEARING COMPANY

The clearing company, of which there are three in the clearing battalion of a medical regiment, (See Chapter II) provides a mobile form of hospitalization for combat troops. The company is organized and equipped for sorting, care, and temporary treatment of patients to be evacuated to the rear. During combat, the station operated by the

clearing company forms the third and rearmost echelon of the division medical service. The operation of the station is based on the principle that casualties shall be evacuated to the rear as safely, rapidly and continuously as human agencies will permit. Accordingly, casualties received are sorted and classified as follows:

Those requiring prolonged care and who are fit for immediate evacuation.

Those requiring prolonged care but needing immediate treatment before evacuation is possible.

Those who are probably returnable to duty within a few days, the number depending on the necessity of keeping the hospital free for movement.

In Camp

In temporary and march camps or bivouacs, one clearing company normally establishes a station for the limited care and treatment of the division sick, pending their return to duty or their evacuation out of the division. Only such tentage is erected as is necessary, allowing a small margin of safety above the apparent needs. Patients will usually remain in those stations not more than 24 to 48 hours.



Plate 13. Airplane View of a Clearing Station, Fully Established.

In camps of more permanent character (mobilization or training areas) training will usually occupy all of the time of the company. A *station* hospital, more or less permanent, usually receives the division's sick.

On the March

A clearing company (or battalion) usually marches as rearmost element of the medical (battalion) regiment in the motorized column (See "Order of March, Medical Regiment," above). When marching, a clearing company performs no technical functions. However, the several companies of a clearing battalion may be disposed so as to provide continuous clearing facilities for the division when the latter is marching. For example, one company may operate a clearing station while the other two companies are marching; this station receives patients until one of the marching companies halts and establishes station.

In Combat

Prior to Combat. The nature of their duties dictates that the clearing companies be the rearmost units in the regimental column and in the rear part of the division area

or column. Prior to combat, one or more of them will frequently be temporarily immobilized with patients who have not yet been evacuated from the division. The companies are ordered to advance individually or as a unit to the vicinity where the station is to be established. If one of the companies has been delayed at the rear with patients, it will usually go into reserve upon rejoining the battalion.

The company commander's reconnaissance consists chiefly in determining the best immediate site for the station with reference to the terrain, roads, approaches and exits for vehicles, the local resources and their availability.

Imminent Combat. When combat is imminent, one or more of the clearing companies of a division medical regiment are established at station within the division zone of action. The remaining company or companies of the battalion constitute a reserve. The number of casualties received and the rapidity of the advance of the combat troops will determine the subsequent use of the reserve. In mobile warfare it may be necessary to move clearing stations daily or oftener. However, these stations are not moved as frequently as the collecting stations.

Clearing companies of corps and army medical units may be employed to relieve or reinforce divisional companies in an emergency. They may also be employed to care for slight, contagious, or gas cases, and may be used in lieu of evacuation hospitals when the situation does not demand a large establishment.

The Station. The *basic unit* forms the nucleus of the clearing station and is always established initially. It consists of the equipment less that for the treatment wards. It includes the station and company office tent, the admission, supply, shock, waiting, bath, evacuation, and surgical tents, the kitchen, and necessary installations. See Plate 14. Due to the diversity of duties incumbent upon the personnel when operating at station, it is impracticable to maintain the unity of administrative and functional organization. See "Clearing Company," Chapter II. To facilitate and systematize training and to insure coordinated functioning within the station, the primary duties classify the personnel into the following groups: Unit headquarters, the technical group, the ward group, and the transportation group. The activities of the station may be divided into six general departments, as follows:

Receiving or admission. This includes:

- Recording.
- Examination and sorting.
- Property exchange.

Treatment. This includes:

- Surgical dressings.
- Shock treatment.
- Bathing and surgical preparation.
- Gas treatment.
- Dispensary service.
- Dental service.

Nursing. This includes the general care and feeding of all patients.

Evacuation. This includes:

- Recording.
- Property exchange.
- Disposition of dead in accordance with existing orders and regulations.

Messing. This includes:

- Personnel of the company.
- Patients.

Administration. This includes:

- Company: Training, records, property, supply, equipment, transportation.
- Clearing station: Training, records, sanitation, litter bearers, and effects of patients.

Selection of site. The general location of the clearing station is designated by the regimental commander subject to approval of G-4. The definite location of the site is determined after reconnaissance by the battalion or company commander. Premature establish-

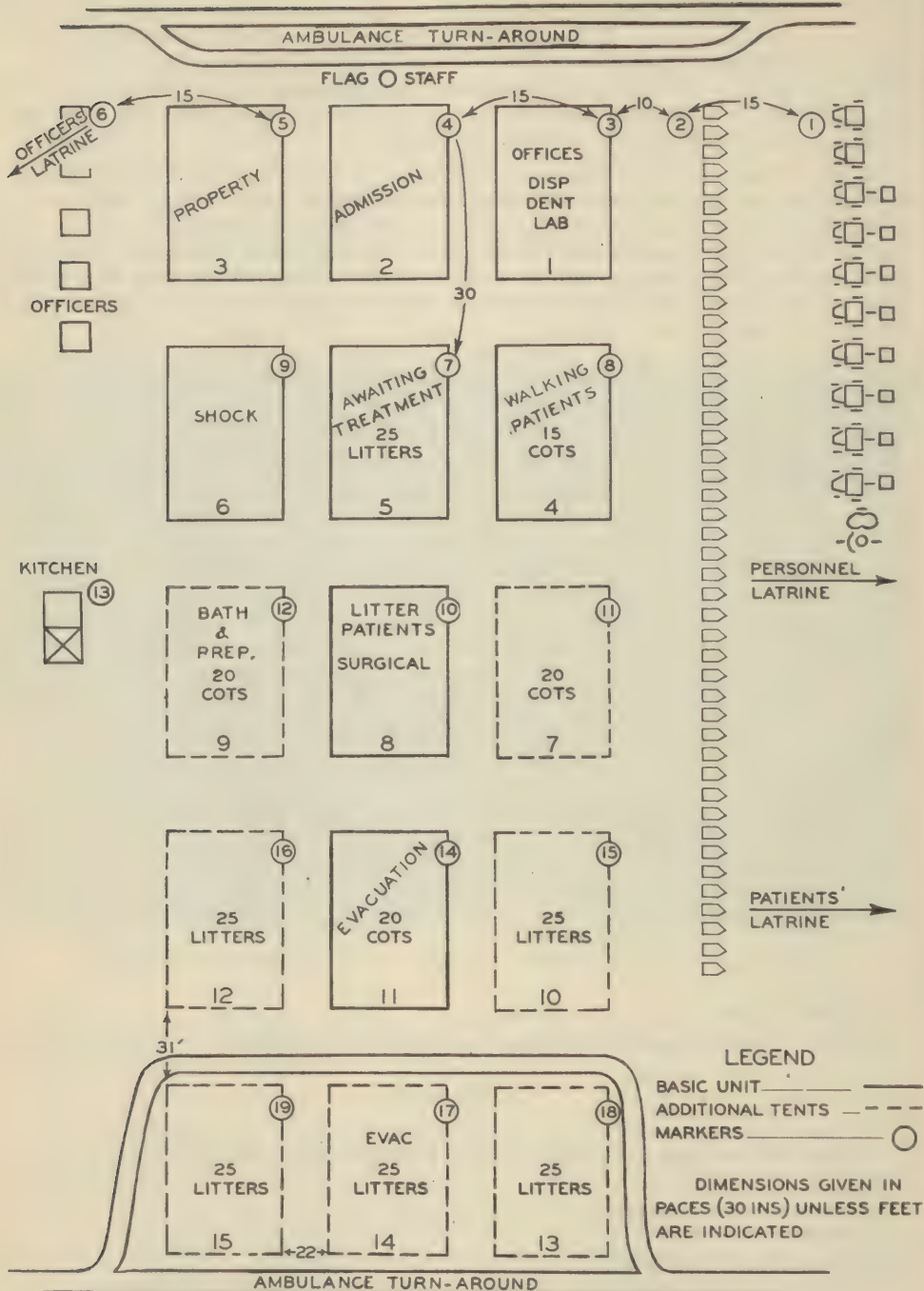


Plate 14. Conventional Ground Plan of a Clearing Station, Square Division.

ment or the selection of an undesirable site is to be avoided, as the station is relatively immobile. The tactical situation and all of the following factors should therefore be considered before a clearing station is established.

Necessary features are: a location on or near a serviceable road on the route of evacuation between collecting stations at the front and evacuation hospitals in rear.

A space (minimum) large enough for the complete station, 125 by 80 yards.

Water supply.

Desirable features are: a location 4 to 7 miles from the battle front, outside the range of hostile light artillery.

Safety from observed long range fire.

Space 150 by 100 yards.

Central location within the division sector or zone of action.

A location on a road circuit.

Soil well drained, level, firm, and free from rocks or large stones.

Buildings that can be used to supplement tentage.

Fuel supply.

Undesirable features are: location in immediate proximity to crossroads, main roads, dumps, and artillery positions.

Heavy-wooded areas.

Ground that is rocky, swampy, or that contains an excess of sand or clay.

Ground plan. See Plate 14. It is impossible to devise a ground plan that may always be used. Grouping of the closely related activities within the stations should be considered primarily when variation of the ground plan is necessary.

Upon establishment of the hospital station, signs indicating its location and the routes thereto are posted at intersections of roads that lead from the battlefront and at such other points as are considered necessary.

Laying out the field. If the plot of ground is suitable, the conventional plan shown in Plate 14 should be used. The entire plot should be marked, regardless of the intention to establish only the basic unit initially or the complete hospital station. It is desirable to mark the location of each tent of the basic unit. Markers (large tent pins) are used to designate tentage to be erected immediately and locations for the necessary sanitary installations. Small tent pins are used to mark the area for possible future expansion. The distance between the ends of adjoining tents is given as 31 feet, which will permit vehicular passage therein. The interval between sides of adjoining tents is 22 feet; this gives ample room for passage of litter bearer squads. If space is restricted the intervals and distances may be reduced to suit the situation at the expense of curtailing vehicular traffic between rows of tents.

Marking. For practical use in the field the pace method (1 pace equals 30 inches) of marking the tent locations is suggested. In the conventional plan (Plate 14) the procedure is as follows: Place marker No. 1 where the right of the transportation line is to be; then take 15 paces across the field and place marker No. 2 where the right front corner of the first shelter tent of the company street will be. Then take 10 more paces in the same direction and place marker No. 3, which will designate the right front corner of tent No. 1. Take 15 paces more and place marker No. 4, designating the right front corner of tent No. 2. Continue 15 paces more and place marker No. 5, designating the right front corner of tent No. 3. Take 15 paces more and place marker No. 6, designating the right front corner of the company commander's tent. From marker No. 4 and at right angles to the line of markers already placed, take 30 paces toward the rear of the area and place marker No. 7, designating the right front corner of tent No. 5. Then on a line parallel to the original line of markers take 15 paces toward the right of the plot and place marker No. 8, indicating the right front corner of tent No. 4. Returning to marker No. 7, take 15 paces on the newly established line and place marker No. 9, indicating the right front corner of tent No. 6. Return to marker No. 7, take 30 paces toward the rear and place marker No. 10, locating the right front corner of tent No. 8. Go through the same procedure as described for the second row of tents, placing markers Nos. 11 and 12. From marker No. 12, take 15 paces on the newly formed line and place marker No. 13, locating the right front corner of the kitchen tent. The same process for

marking the tentage in rows 4 and 5 should be used. Markers are now placed to indicate the locations of latrines for officers, enlisted men, and patients, respectively.

Erection of tentage. The transportation of the company comes on the field as soon as marker No. 1 is placed. It forms in line facing the area which the station is to occupy with the right front wheel of the first vehicle resting at the marker. At the command DISMOUNT, given by the first sergeant, motors are stopped and all enlisted personnel with their equipment fall in, in company formation, with the right guide resting at marker No. 2 and facing the area which the station is to occupy. The first sergeant then commands: UNSLING EQUIPMENT. The packs having been disposed of the first sergeant commands: FORM FOR HEAVY TENT PITCHING. At this command the clerks, buglers, motorcyclist, cooks, mess sergeant, kitchen police, and sanitary detail fall out. The remainder of the company close in to the right and are divided into tent-pitching squads of eight men and one noncommissioned officer each. Each squad is assigned a tent to erect and is marched to the marker by the noncommissioned officer. As the squads march off, the drivers of the trucks containing the tentage to be erected go to their trucks and distribute the tents. All turning movements by trucks are to the left, in and around the station. The drivers return to their tent-pitching squads after tentage is unloaded. The tentage for the complete basic unit must be erected in any situation and such additional tentage as determined by the company commander to meet the needs of the particular situation. Sufficient personnel is available to erect all the tentage of the basic unit simultaneously. If additional ward tentage is required immediately, selected tent-pitching squads will continue to erect the same under the direction of the first sergeant. The kitchen detail sets up the kitchen tent and fly and establishes the kitchen. The sanitation detail digs the latrines and sets up the screens. The clerks and motorcyclist erect the company officers' tentage. For the pitching of the ward tents see TR 225-35.

Installation of equipment. After the tentage for the basic unit is erected, the personnel assigned to each tent proceed to their respective places of duty. The trucks, having been placed in front of the tents for which they have equipment, are then unloaded by the detail assigned to the tent and returned to the transportation line when unloaded. The supply department issues such supplies as are needed by the various treatment sections and establishes the property exchange in front of tent No. 2. All tentage is inspected, and repaired if necessary. The area about each tent is policed by the personnel assigned thereto. The clearing station is ready to function as soon as the basic unit is established. This should be accomplished within an hour after the company arrives at the site.

Operation of the Clearing Station. The operation of the station may be described by the steps through which a patient may be taken on arrival. These include reception, classification, distribution, treatment, and evacuation. For descriptive purposes the operation of the clearing station by tents, rather than by departments, will be used, as some of the tents contain several activities.

Office tent (No. 1). The operation of the *company office* in the field does not differ materially from its operation in garrison. The reports, returns, and records are the same as in all other companies. The company commander directs the activities of the company from this office. The first sergeant controls the details of enlisted personnel and assists the company commander. Clerks are available for the preparation of the routine reports, keeping of files, etc. The motorcyclist, who is used in combat as messenger, habitually remains in the vicinity of this tent. When the station is ready to receive patients or has cleared and closed, the battalion commander is notified. This office serves as the *unit message center*.

The *clearing station office section* operates as a distinct entity and keeps those records pertaining exclusively to patients. From the lists of admissions and dispositions received at intervals from the admission and evacuation tents, a consolidated report is made periodically and sent to the surgeon of the division, corps, or army to which the regiment pertains, through battalion headquarters. In case any burials have been made by company personnel, the location thereof is given, with a sketch of the plot if practicable. Names are not shown on the consolidated report until final disposition is effected. The form used for the admission report can be utilized for the consolidated report. In addition to the consolidated report, a condensed report of casualties is required for the information of the battalion commander and the division, corps, or

army surgeon. These reports are furnished at regular intervals or on request. A suggested form follows:

CLEARING COMPANY			
At		a.m. a.m.	
Date		p.m. p.m.	
To			
REPORT OF CASUALTIES DURING PERIOD			
	Litter	Sitting	
REMAINING IN SECTION AT LAST REPORT	
ADMISSIONS DURING PERIOD:			
Wounded	
Gassed	
Sick	
TOTAL	
EVACUATED DURING PERIOD	
REMAINING	

If a clearing station is furnishing definitive treatment (hospitalization) in a camp, the emergency medical tag should be supplanted by the field medical record. (AR 40-1055 and 40-1060). See Field Medical Record below.

The *dental service* is under the supervision of the senior dental surgeon of the company. In addition to furnishing the ordinary dental service to the duty personnel and such patients as may be sent back for treatment from the forward areas, it operates as an adjunct of the surgical service in the treatment of wounds about the face. During combat it will be found necessary to use one of the dental surgeons in the surgical tent. One dental technician is assigned to this service.

The *dispensary and laboratory* are operated by the company pharmacist under the supervision of the company commander. The dispensary is designed primarily for the convenience of the sick of the company. It includes a prophylaxis unit. The equipment for the laboratory permits clinical procedure such as *blood counting, staining of blood smears, and urinalysis*.

Admission tent (No. 2). Receiving: All patients are received at this tent, regardless of the manner in which they arrive or the character of their disabilities. Incoming ambulances are unloaded by a squad of four bearers, who carry the litter patients into the tent.

Property exchange: A supply of litters, splints, blankets, etc., is maintained at the front of the tent. When an ambulance delivers a patient on a litter or with attached splints or other medical equipment, an exact exchange is made at once with the ambulance driver. A representative of the supply department has charge of this exchange.

Sorting (Triage): Each patient as he arrives is given a hasty examination by the admission officer to determine immediate disposition. All cases are sorted and classified as medical or surgical. Gassed cases fall into either class, depending upon the lesions produced and the treatment to be given.

Recording: A noncommissioned officer keeps a record of all incoming patients. The necessary information is obtained by questioning the patient or from the emergency medical tag. In case a patient arrives without an emergency tag, one is made out here and attached to the patient as prescribed in AR 40-1055. At stated intervals, record sheets are sent to the hospital station office in tent No. 1. The following sample form is suggested as a suitable one for the *hospital record*:

Admission Record

G.S.W.	Gunshot wound.	Clearing station
B.W.	Bayonet wound.	Date
	Sick.	Location
Ga.	Gassed:	Admitted
	(M) Mustard.	Ev. Evacuated
	(P) Phosgene.	Remaining
Sl.	Slight.	Died
S.	Severe.	R.T.F. Returned to front
L.	Litter.	
A.	Ambulant.	

CONSOLIDATED¹ LIST OF SICK AND WOUNDED

Name	Army serial number	Grade and organ- ization	Diagnosis	Litter or ambulant	Admission date & hour	Disposition date, hour & hospital

¹ Strike out if not consolidated.

Disposition: The admission officer directs the disposition to be made in each case. Patients with hemorrhage or with tourniquets in place are given priority and sent to the surgical tent at once. Litter bearers carry or direct the patients to their proper destination within the station. Malingerers fit for duty are turned over to the military police detailed at the station and are reported to the adjutant of the unit to which the medical regiment is assigned or attached.

Valuables and individual equipment: When a clearing station is operating as a fixed hospital it will be necessary to receipt for valuables as provided for in AR 40-590. Arms and equipment accompanying patients are turned over to the supply tent for delivery to the division salvage officer. In combat the valuables of patients are not usually taken over for safekeeping, though every effort is made by all personnel to safeguard the property of patients while in the station.

Waiting: This part of the receiving tent provides shelter for patients awaiting their turn for treatment. It is obvious that in combat when wounded predominate, the capacity of the treatment tents will soon be overtaxed, hence this provision. Priority in treatment is determined by the admitting officer. One man is assigned in charge. He arranges and releases the cases in the order of their priority. It is his duty to keep in touch with each department, informing them of the number and condition of the cases awaiting treatment. In addition he renders such service as will add to the comfort of the waiting patients. Litter bearers transfer cases from the receiving tent to the litter patients' department.

Supply tent (No. 3). The supply officer, who is also the mess officer, supervises the operation of this tent. The supply sergeant is in direct charge of its functioning. Close contact with the headquarters and service company from which all supplies are received is essential. The latter will usually be near the clearing station. The supply needs of the station must be anticipated and secured as required, since only a small reserve is carried on the transportation of the clearing company. When transportation is needed it is obtained from the transportation section.

The supply officer of this section is charged with the collection and disposition of *salvaged equipment and clothing* obtained from patients. During combat it is disposed of daily by removal to the division salvage dump. In camp, clothing and equipment removed from patients are stored in the supply tent until the patient has recovered or is transferred, when it is returned to the individual.

The company mechanic is assigned to this tent and is charged with the *repair and upkeep of the equipment* of the company and station.

The amount of *equipment and supplies* that will be placed within the tent is variable. Tents and equipment for treatment wards not set up may be left on the trucks unless it is necessary to use the latter for other purposes. The principle that governs the unloading of equipment is that only such articles the use of which can be anticipated, need be removed from the transport.

Treatment tents (Nos. 4, 5 and 8). These tents are designated as treatment departments, one for the care of wounded able to walk and the others for litter cases. It is quite necessary to treat these types of cases separately as wounded able to walk will soon crowd the litter-wounded department to such an extent that the treatment of the latter will be handicapped. In the litter-wounded department, litter racks are improvised

on dressing boxes. Litter patients are not removed from the litters. Replenishment of supplies is effected from the supply tent.

If operative work of an extensive character is necessary, tent No. 8 may be used as a surgical tent. The work is under the supervision of the senior medical officer assigned thereto. The senior noncommissioned officer supervises the enlisted personnel and sees that the equipment is installed and maintained in condition to operate effectively. He should be a trained anesthetist. Although emergency operations are performed, the treatment is usually confined to the changing and adjustment of dressings, arrests of hemorrhage, adjustment or application of splints, and administration of antitetanic serum. Provisions are made for the conduct of all surgical procedures under aseptic methods. Ground cloths (paulins) are available, and it will often be found desirable to use them. Two improvised operating tables are utilized. A wheeled litter carrier is available for use as a third table in emergencies. Litter patients received are not removed from the litters, as the latter form the bed of the improvised operating tables. Except for two general utility men, the enlisted force of this tent must be well-trained surgical technicians, two of whom in addition must be competent to administer general anesthesia. Replenishment of surgical supplies is effected from the supply tent.

The operating surgeon determines the disposition of patients treated by him. Those suitable for evacuation at once are sent to the evacuation tent or other tents designated as evacuation wards. Those who require further treatment before evacuation is advisable are sent to the shock ward or to a ward designated for detained patients. Those suitable for return to duty are sent to the evacuation tent, the fact of suitability for duty having been entered on the emergency medical tags. A concise record of treatment given must be entered on emergency medical tags before patients leave the tent. Care must be exercised to prevent the filling of the station with patients who are suitable for evacuation. Patients are removed or directed to their appropriate destination within the station by the litter bearers stationed at the rear of the tent.

The officers in charge of each tent determines the disposition of the patients after treatment. Those suitable for evacuation at once are sent to the evacuation tents. Those who require treatment for traumatic shock before evacuation is advisable, are sent to the shock tent. Those suitable for return to duty are sent to the evacuation tent, the fact of suitability for duty having been entered on the emergency medical tag. A concise record of treatment given must be entered on the emergency medical tag, before patients leave the tent. Patients are removed or directed to their appropriate destination within the station by the litter bearers stationed at the rear of the tents. Antitetanic serum is given, if not previously administered.

Shock tent (No. 6). The shock tent is under the supervision of a medical officer. Although the facilities for treatment in the clearing station are limited, they can be made effective with well-trained personnel. Hypodermic medication is given under the direction of an officer. The administration of glucose solution or blood plasma intravenously is practicable. Patients are usually received from the admission tent but may be received from any of the treatment departments. Notation is made on the emergency medical tag of all treatments given. When patients have sufficiently recovered or death intervenes, they are disposed of as directed by the admitting officer and are removed by litter bearers working in the rear of the second row of tents.

Evacuation tent (No. 11 or No. 14). The evacuation (forwarding) tent is under the supervision of the evacuation officer. When the basic unit only is established, tent No. 11 is so utilized. When the complete clearing station is established, tent No. 14 is used. The evacuation tent should be located at the rear of the station and easily accessible to evacuating ambulances. Litter patients are brought into the tent and arranged for evacuation in such priority as their conditions demand. Walking patients need not be held within the tent but may be grouped outside under the supervision of a wounded officer or non-commissioned officer. As ambulances arrive the litter squad in rear of the tent loads the patients into them. In case of slowness of the evacuating system it may be necessary to utilize several tents to shelter patients awaiting evacuation. Patients designated for re-

turn to duty during combat are reported for disposition to the adjutant of the unit to which the medical regiment is assigned or attached.

Records: A clerk keeps a record showing the disposition of all patients whether by death, evacuation, or return to duty. These lists are sent at intervals to the office tent for consolidation. Each case is given a final inspection by the evacuation officer who makes sure that the emergency medical tag is attached. When a death occurs within the station, the evacuation sergeant is notified. He prepares the necessary records, showing the disposition of the body.

The following sample form is suggested for the *evacuation record*:

EVACUATION RECORD				
L. Litter. A. Ambulant. M.P. to military police.		Clearing Station _____ Location _____		
Name	Army serial number	Disposition	L. or A., etc.	Hour

Property exchange: As outgoing patients are being loaded, an exchange of the litters, blankets, etc., accompanying the patients is made between the ambulance driver and a representative of the supply department. When a considerable quantity of these articles have accumulated, they are removed to the incoming property exchange at tent No. 2 to prevent depletion of the supply at that place.

Equipment: No equipment is provided for the evacuation tent. If blankets or other supplies are found necessary, they are obtained from the supply tent.

Bath and preparation tent (a designated tent when necessary). The bath and preparation tent is under the supervision of the admission officer who designates the patients that will be sent to the tent and their subsequent destination. It is equipped to furnish service of four kinds as follows:

Bathing.

Preparation for surgical procedures.

Treatment for gassed cases.

Disinfestation.

The procedures performed will vary with the types of cases the station is receiving. If surgical cases predominate, the tent becomes an adjunct to the surgical service. Patients who are to receive surgical treatment are given the necessary preparation such as bathing, shaving of parts, removal of outer clothing or change to hospital clothing. Sufficient hot water must be available at all times. Although the water heating unit in the tent is of sufficient capacity to meet ordinary requirements, the mess department is charged with the responsibility of maintaining an additional supply of hot water for emergency use.

Clothing removed from enlisted men is delivered to the supply tent for salvage. Officers' clothing, if removed, is placed in bundles, tagged with the owner's name, and sent to the evacuation tent to accompany the officer when he leaves the station. When a change of clothing is made, care must be exercised to see that the emergency medical tag is attached to the patient before he leaves the tent and that the treatment given is noted on the tag. When the preparation or treatment has been completed, patients are conveyed by litter bearers to the destination designated by the admission officer.

Gassed cases: In addition to the bathing facilities and clothing change provided for in this tent, solutions for treating gas burns and washing out the eyes are available. The personnel should be trained to understand the dangers to themselves and to others in the handling of gassed cases. If the station is designated to receive gassed cases only, gas teams from the auxiliary surgical group (see Chapter V) may be attached to the unit.

Kitchen. The kitchen is usually the first unit established and the last to cease functioning. The mess is charged with feeding the personnel of the company and the patients in the station. The mess sergeant operates the mess under the supervision of the mess officer. Two of the cooks operate the company mess; the others prepare food for the patients. The personnel of the company messes in the manner common to all companies in the field except that two servings at meal time will be necessary to take care of the personnel on duty when the station is operating.

Rations for personnel are delivered by the regimental supply officer. When in the combat zone, rations for patients are obtained in the same manner. If the company is functioning as a camp hospital outside the combat zone, rations for patients are computed as prescribed in AR 40-590. A limited supply of concentrated soups, coffee, etc., is carried as part of the special supplies for the mess. Replacement of these special supplies must be made through the medical supply service. In combat, food for litter patients will usually consist of soup, coffee, and other stimulating drinks. These should be available at all times when the station is established. Food is best served by carrying it in food containers direct to the ward tents. Metal dishes are provided for patients. Ambulatory cases are fed at the kitchen. This department is also charged with the responsibility of keeping a supply of hot water available at all times for treatment of patients. Two water sterilizing bags are set up at the kitchen to provide a supply of drinking water. The required sanitary installations for disposal of garbage, etc., about a field mess are installed and maintained by the personnel assigned to duty at the kitchen.

Transportation. The platoon includes the transportation officer, transportation sergeant, the mechanic, and the chauffeurs for the vehicles. While on the march this platoon is fully concerned with the operation of the vehicles of the convoy. In camp and when the company establishes station, each driver goes over his vehicle and prepares it for immediate use. In most instances this includes the minor adjustments, cleaning, gassing, oiling, and greasing of the vehicle. Repairs are made whenever possible by the mechanic. Major repairs are those which cannot be made in the unit and are referred to the next higher repair echelon for disposition. All requests for transportation are made to the transportation sergeant who is held responsible for the most economical use of the transportation consistent with efficient service.

This platoon will furnish the majority of company details, kitchen police, etc., when the station is operating. In addition, this platoon furnishes litter bearers. Each truck driver must know exactly the company equipment his truck habitually carries. He is responsible that it is loaded properly and well secured before movement.

Preparation for Movement, and Closing the Station. It requires approximately two hours for a trained company to close, strike, and load a clearing station that has been completely established. Orders for the closing of a station may usually be anticipated in time to permit preparation for movement. It will often be possible to contract the station by the closing of wards or other activities as they no longer become necessary. In this way time will be saved when the hour arrives for the complete dismantling of the station. Provision for this is made by higher commanders. It is an obligation of the company commander to keep higher commanders informed as to evacuation requirements. Surgical hospitals will usually receive nonevacuable patients. If these hospitals are established nearby, other patients may be turned over to them when quick movement is demanded and the clearing of patients may not otherwise be accomplished. Responsibility for the care of patients ceases only when they are actually evacuated. In retrograde movements, if it becomes necessary to abandon the station and its patients, only such personnel and equipment as are necessary to care for the patients should be left behind.

The company commander directs the procedure of closing station; the other officers and the first sergeant oversee the details of dismantling and the loading of trucks.

The personnel in each tent packs the equipment and carries it to the front end of the tent. The trucks designated to carry equipment are driven to those tents whose equipment they carry, where it is loaded by the tent personnel. Tent striking squads are then formed, one such being assigned to each tent to strike and fold it for transportation. The

kitchen and sanitary details strike the canvas pertaining to their places of duty. The clerks and motorcyclists strike the officer's tent.

The latrines are closed, the station area policed and inspected.

The Field Medical Record. If definitive treatment is given to a patient a field medical record should be made. Because the clearing station is the most forward installation at which the field medical record might possibly be used it is described below. Ordinarily, only emergency medical tags would be used in the clearing stations.

Purpose, composition, general use. The purpose of the field medical record, composed

<div>Hospital No.</div> <div>Date of entry</div>	<div>Hospital No.</div> <div>Date of entry</div> <div><div>Copy of the F. M. R. was forwarded with the S. and W. report of Hospital for the month of as required in cases on sick report longer than one month.</div></div>	<div>A. S. No.</div> <div><div>(Surname) (Christian Name)</div><div><div>Rank</div><div>Company</div><div>Regiment or Staff Corps</div></div><div><div>Age (years)</div><div>Race</div><div>Nativity</div><div>Service (years)</div></div></div> <div><div>Date of admission</div><div>Source of admission</div></div> <div><div>Hospital No. ....</div><div><div>Dose and time:</div><div>Morphia</div><div>A. T. serum</div><div>Diagnosis, etc.</div></div></div> <div><div>Line of duty:</div></div> <div><div>Form 550</div><div>MEDICAL DEPARTMENT, U. S. A.</div><div>(Authorized June 25, 1909)</div><div>5-12204</div></div>
---	--	--

(Front)

<div>Date of entry and hospital unit receiving patient must be recorded immediately upon admission. Important changes in diagnosis, complications, operations, etc., are to be added later, giving dates.</div>		
<div>Hospital No.</div> <div>Date of entry</div>	<div>Hospital No.</div> <div>Date of entry</div>	<div>Hospital No.</div> <div>Date of entry</div>
<div>This card, with envelope, constitutes the Field Medical Record for all sick and wounded. Upon transfer the F. M. R. must accompany the patient, attached to his clothing. It must not be destroyed. No patient must be transferred without one. When evacuated to the Zone of the Interior, the F. M. R. must accompany him.</div> <div>5-12204</div>		

(Back)

Plate 15. Field Medical Record: The Field Medical Card, Form No. 52c, M. D.
The Field Medical Card is folded and inserted in the Field Medical Jacket.

of the field medical card, Form 52c, M. D. (see Plate 15), and field medical jacket, Form 52d, M. D. (see Plate 16), with such inclosures as are herein authorized, is to furnish a brief consecutive history of each patient in a theatre of operations in time of war, and during maneuvers or other field operations in time of peace, who is treated in hospital. The card will not, however, be used as a clinical history sheet, for this would result in all the available space being used and none being left for recording the basic data for which the record is intended. This record will be used at all times by surgical and evacuation hospitals. In a theater of operations, registers of sick and wounded will not be maintained; therefore the field medical record rather than the register card, Form 52, M. D., will be used by station, general, and convalescent hospitals in this situation.

Where started, contents, matters to accompany. The record will be started for each case at the first of the hospitals mentioned above where definitive treatment is furnished. Immediately upon admission to hospital, the army serial number and name will be entered on the first fold of the card and on the outside of the jacket in the spaces provided. The Emergency Medical Tag and any other clinical record of value received with the patient, will be inclosed in the jacket along with the newly started field medical card. Other data for which space is provided, such as rank, company, regiment, etc., will be entered as soon as possible.

NOTE.—To be securely tied to patient's clothing over breast. To contain field medical card and any other clinical record relative to patient.

Army Serial No. _____

Surname _____ Christian Name _____

Rank _____ Co. _____ Regiment or Staff Corps _____

Date of first admission to sick report _____

Diagnosis (brief) _____

Sick	Slight	Walking case
Wounded	Severe	Sitting case
Gassed		Lying case

(Strike out words not applicable.)

Special attention needed in transit, or other remarks: _____

Copy of this F. M. R. was forwarded with the S. & W. report of _____ Hosp. No. _____ for the month of _____, as required in cases on sick report longer than one month.

Form 52d
MEDICAL DEPARTMENT, U. S. ARMY
(Authorized Type 22, 1920.)

NOTE.—The inner retaining flap of the envelope must be raised before placing papers inside; then folded down over the contents to prevent them from dropping out. The outer flap will be folded over the opening as an additional means of protecting contents.

TRANSPORTATION MEMORANDA

(In order that the movement of patient from front to rear may be recorded chronologically, all transportation units, such as Amb. Co., Hosp. Train, Hosp. Ship, Transp. Co., etc., transferring patients from one hospital to another, will make appropriate entries in the spaces provided below.)

Patient was transported

From _____ to _____ by _____
(Hosp. unit.) (Hosp. unit.) (Transp. organ.) (Date)

From _____ to _____ by _____

From _____ to _____ by _____

From _____ to _____ by _____

Transferred _____ from Theater of Operations to _____
(Date.) (Designation of ship, train, or other org.)

Zone of the Interior by _____
(Hosp. or place.)

Departing from _____
(Date.) (Hosp. or place.)

Arrived at _____ (Zone of the Int.)
(Date.) (Hosp. or place.)

_____ and forwarded to _____
(Date.) (Hosp. or place.)

_____ by _____ for definitive treatment.
(Date.) (Designation of transp. or other org.)

Plate 16. Field Medical Record: The Field Medical Jacket, Form No. 52d, M. D.
Contains the Field Medical Card.

Disposition, additions, verifications, corrections. After the record is started it must always remain with the patient, either at his bedside when in hospital or attached to his clothing when in transit from one hospital to another until it is disposed of as prescribed below. From time to time the necessary entries will be made on the card showing complications, intercurrent diseases, operations, and dispositions, with dates. Ward officers and at-

tendants will verify, and correct when necessary, any entries on the record, particularly as to names, serial numbers and organization.

Disposition of records of completed cases. The record for each case completed, by return to duty or by death, in a theatre of operation in time of war or in maneuver hospitals of a mobile type in time of peace, will be removed at once and forwarded with the next monthly report of sick and wounded to the chief surgeon of the field force or to the surgeon of the department or corps area, for transmittal to the surgeon general.

Disposition of records of cases transferred to the zone of the interior. The field medical records will be attached to the clothing of each patient transferred in time of war from any hospital in a theatre of operations to a hospital in the zone of the interior, and from any hospital of a mobile type for troops engaged in maneuver, or in the field to any fixed hospital. Each field medical record thus received will be removed at once and closed, and the record of the case taken up on the hospital register. Field medical records of patients evacuated from a theatre of operations will be closed when the patients reach hospitals where they are to receive definitive treatment; these records will be forwarded directly to The Surgeon General within twenty-four hours. Field medical records received at a fixed hospital from a mobile hospital in time of peace or in the zone of the interior in war will be forwarded to The Surgeon General with the next report of sick and wounded.

Abbreviations for use on E.M.T. (Chapter I) and the field medical record. The abbreviations listed below are authorized for use only on emergency medical tags and field medical records. No additions to or deviations from this list of abbreviations will be permitted. Whenever such changes become necessary and are approved by the War Department they will appear as amendments in such subsequent reprints of regulations as may be issued from time to time.

C W	.....Contused wound.	L W	..... Lacerated wound.
E W	..... Extensive wound.	M W	..... Multiple wounds.
F U O	..... Fever of undetermined origin	N Y D	..... Not yet diagnosed.
F C	..... Fracture compound.	Pen W	..... Penetrating wound.
F C C	..... Fracture compound comminuted.	Perf W	..... Perforating wound.
F S	..... Fracture, simple.	Pun W	..... Punctured wound.
G S W	..... Gunshot wound.	S V	..... Severe.
I W	..... Incised wound.	S	..... Slight.
K I A	..... Killed in action.	WIA	..... Wounded in action.

Regulations regarding records of sick and wounded. Regulations to be consulted in connection with compiling and keeping records of sick and wounded will be found in AR 40-1025, 40-1030, 40-1035, 40-1040, 40-1045, 40-1050, 40-1055, 40-1060, 40-1065, and 40-1070. Also see FM 8-45.

EMPLOYMENT OF THE HEADQUARTERS AND SERVICE COMPANY

The general functions and the functional organization of the Headquarters and Service Company are included in Chapter II. These include administrative duties of its personnel and their employment in maintaining medical supplies for the entire division, general supplies for the medical regiment, and the duties incident thereto. The operation of the supply system in combat will be considered below.

In Camp and On the March. The employment of the Headquarters and Service Company in camp or bivouac and on the march is described in the section "Employment of the Medical Regiment," above.

Orders. Orders for the employment and movement of the Headquarters and Service Company are received from the regimental commander. They are frequently in oral or message form. Orders relative to division supply matters are received from division headquarters, through the regimental commander, in the division administrative order or fragmentary messages pertaining thereto.

Plans. The company commander keeps informed of the location and duties of all elements of the medical regiment, of the location and manner of operation of division supply installations and of the army medical depot, and of the roads and terrain in the area in which the division is operating. His plans include not only those for the immediate

supply of all units dependent on the Headquarters and Service Company but also for their supply in the next situation which may confront them.

Procedure in Handling all Supplies. *The plan of supply.* The regimental commander (division surgeon), in accordance with the policy of division headquarters, decides on the plan of supply after consultation with the supply officer (commander of the headquarters and service company), the plans and training officer, and frequently with battalion commanders. The plan includes:

Method of notification to supply officer of unit requirements.

Procurement of all classes of supplies, equipment, and necessary facilities.

Distribution of all classes of supplies and equipment, the location of regimental distributing points or point, and the method of distribution in each situation.

Utilization of transportation and when necessary its procurement, for movement of supplies, equipment, and personnel.

Collection and salvage of discarded matériel.

Disbursement of funds for the maintenance of the regiment (excluding pay of the troops and organization funds).

The supply officer. The commander of the Headquarters and Service Company, being both regimental supply officer and division medical supply officer, is responsible for the proper functioning of the supply system in accordance with the plan adopted. His sphere of operations includes, for general supply, all units in the medical regiment, and for medical supply, all units in the division. When necessary in the execution of his duties he visits in person or sends an assistant to all units in the regiment, to all medical units in the division, to G-4 of the division, to the division supply officer from whom he receives supplies, and to supply officers of units in the division to whom he issues medical supplies.



Plate 17. Distributing Point Operated by the Headquarters and Service Company.

The assistant supply officers. The assistant supply officers are placed in direct charge of general and medical supply respectively, and to them is ordinarily delegated a large amount of responsibility and authority in their own spheres of activity. Their work is, however, directed, supervised and facilitated by the supply officer.

Requisitions for supplies. Requisitions, formal or informal as required, for supplies of all kinds are sent directly to the office of the regimental supply officer which is located at the distributing point of the medical regiment. Office personnel is furnished by the Headquarters and Service Company. The distributing point is usually located close to the clearing station because the requirements as to roads, shelter, and facilities coincide. This location, in its relation to divisional supply installations and all medical units of the division, facilitates the operation of supply. Such supplies as are called for on requisitions, and

if available, are distributed at suitable times in accordance with the announced policy of the regimental commander (division surgeon). In combat, supplies are frequently issued to units in forward areas at night. Other items are consolidated and sent to division headquarters for action by the head of the supply service concerned.

Supplies for patients. Supplies of all kinds required for patients are obtained in the same way as described below, but it is usually necessary to make special arrangements, particularly for desired components of the ration, with the division quartermaster.

Procedure in Handling General Supplies. The Headquarters and Service Company handles general supplies for the medical regiment only.

Requisitions. Requisitions received are checked as to accuracy and as to their necessity. Those requiring decision are taken to the regimental commander with suitable recommendations as to action. Those to be forwarded are consolidated and presented to the regimental commander for his signature.

Drawing supplies. Supplies are usually drawn by the assistant general supply officer with a detail of enlisted men, from a representative of the supply service concerned, at the proper division distributing point (truckhead or railhead) at hours designated in the division administrative order. The supplies are checked as drawn, loaded on Headquarters and Service Company trucks, and moved to the regimental service station. Here they are sorted and divided into loads according to the requirements of each company in the regiment.

Distribution of supplies. Distribution of supplies is made at the time and place designated by the supply officer, acting for the regimental commander. The location of the Headquarters and Service Company (service station) is usually designated as the distributing point for units in that vicinity, as for a regimental camp or for clearing companies during combat. For detached units and for those located throughout the division, particularly those operating in the forward area in combat, distributing points are designated as close to each unit or group of units as is practicable in the situation. The regimental distributing point for gasoline and oil is frequently at the service station where distribution is made to individual vehicles as required. The Headquarters and Service Company delivers supplies to distributing points for each company to be supplied there. Each unit to be supplied sends a detail with suitable transportation to the distributing point, receives and checks the supplies, and moves them to its own station. Sometimes the Headquarters and Service Company may be able to deliver direct to a company at station. In certain situations as, for example, where a collecting company is established well forward from a distributing point, supplies may be delivered to it on vehicles of another unit, e. g., ambulances. It may also be necessary at times to move supplies by hand with details from the receiving company or from one which is in reserve. In any case, the supplies should be received from the Headquarters and Service Company at the distributing point by a representative of the receiving company, who will conduct them forward. Whatever the method, it should be remembered that the impetus of supply is from the rear. The Headquarters and Service Company should insure delivery and not delegate its own function to another unit, unless by so doing better service can be given.

Distribution on the march. On the march it is the usual practice for the headquarters and service company to distribute Class I supplies to companies after the march, in the late afternoon or early evening, and to draw them from the division distributing point the same afternoon or the next morning, as directed in division orders.

Procedure in Handling Medical Supplies. *Special features of medical supply.* The procedure in handling medical supplies is the same in principle as for general supplies. There are, however, certain special features:

The division surgeon (regimental commander) is the head of the medical supply service for the entire division.

The commander of the Headquarters and Service Company is the medical supply officer for the entire division.

Medical supplies may be received at the railhead or at the army medical supply depot (medical refilling point) by the medical supply officer acting for the division surgeon.

The Headquarters and Service Company carries a reserve of medical supplies for the

entire division and distributes them to all units requiring them. This normal reserve may be augmented just before or during combat by procuring additional items, the need for which can be definitely foreseen, from the army medical depot.

Collecting companies carry a small reserve of essential items for the supply of medical detachments of combat units, in emergencies.

All medical units in the division have a normal unit equipment of essential supplies sufficient for one day of severe combat.

Each medical unit in the division receiving a patient exchanges splints, blankets, litters, and similar property accompanying the patient, with the unit transferring the patient at the time and place of the transfer.

Requisitions from units other than the medical regiment. Requisitions from units other than those of the medical regiment are normally prepared by the surgeons of line regiments and separate organizations, acting for the unit supply officer of the regiment. The unit supply officer signs the requisition for the organization commander and forwards it direct to the division medical supply officer (commander of the Headquarters and Service Company). The medical supply officer acts on the requisition for and in accordance with the policies of the division surgeon, taking up with him in person such matters as are necessary. Requisitions that can not be filled out of reserve stock are consolidated and sent to division headquarters for approval. In emergencies, and normally in combat, requisitions are in the form of simple requests that are forwarded direct from the medical officers making them to the medical unit in their immediate rear, as from infantry battalions to collecting companies, or direct to the medical supply officer when convenient.

Requisitions from companies of the medical regiment. Requisitions, both formal, and informal in emergencies, from companies in the medical regiment are preferably forwarded through battalion commanders to the division medical supply officer who takes the same action as explained in the preceding paragraph.

Drawing medical supplies. Medical supplies are procured by the division medical supply officer on consolidated requisition forwarded through division headquarters. The division medical supply officer receives them at the army medical supply depot or at the railroad head. In either case he checks the shipment, loads it in Headquarters and Service Company trucks and moves it to the station of the Headquarters and Service Company. Here the supplies are checked in detail, sorted, and prepared for issue or placed in reserve. In emergencies informal requisitions on the army medical supply depot are prepared, and after approval is obtained at division headquarters, are sent with trucks and detail with which to move supplies from the depot. Division headquarters may at times direct that such supplies be moved on trucks other than those of the Headquarters and Service Company or may direct the company trucks to move other supplies on the same trip.

Distribution of medical supplies. Distribution of medical supplies to companies of the medical regiment is made in the same manner as described for general supplies. (Chapter X). Every effort is made to deliver supplies direct to companies in Headquarters and Service Company trucks. When this is impracticable, ambulances or carrying parties are employed.

Distribution of medical supplies to organizations other than those of the medical regiment are, except in combat, made by routine to the unit supply officer of the organization concerned or direct to the medical detachment of the organization with the full cognizance of the unit supply officer. In combat, medical supplies are forwarded direct by the most available means. The Headquarters and Service Company, utilizing its own trucks, delivers direct to all units in so far as it is practicable. It is not ordinarily practicable to make such delivery to front line units. In this case supplies may be delivered direct or by means of ambulances, to collecting companies, which at once forward them by litter bearers. Collecting companies, by the same means, forward items required of them by medical sections of front line combat battalions, taking these items from the reserve which they carry for this purpose.

Medical supply to medical detachments of corps and army troops. Medical battalions or regiments of corps and army troops, respectively have the same responsibility as to medical supply of medical detachments with units of corps and army troops within the

zone of action to which they are assigned, as has been described for divisional medical regiments.

Employment of Transportation. Transportation of the Headquarters and Service Company is used as a pool under direction of the company commander. When not engaged in hauling supplies it is parked under cover or camouflaged in the vicinity of the service station. In order to facilitate procurement and distribution, so much of the normal loads of the trucks as may be necessary are unloaded. If additional trucks are required for the operation of the supply their normal loads are placed in a dump in the service area.

EMPLOYMENT OF THE MEDICAL BATTALION

Introduction. The medical battalion furnishes on a smaller scale the medical service to the Infantry Division, "Triangular," similar to the medical service furnished by the medical regiment to the infantry division "square." It is an organic medical battalion, having the necessary functional components to establish and operate the installations for evacuation with the division zone. The principles of operation and the employment of the subunits of the medical battalion to include sections are identical to those of the medical regiment or the medical squadron. Although the organization of the medical battalion companies may include within one company the functional elements of two different companies, the organization is such that the functions of these elements can operate separately and accomplish on a smaller basis the same evacuation as the combined facilities of the medical regiment. Comparative functions corresponding to similar elements of the medical regiment, are related below:

Headquarters Detachment. The headquarters detachment includes the facilities necessary for the operation of combined functions of the regimental headquarters and the headquarters and service company of the medical regiment. (See Chapter II.)

The *detachment headquarters* performs the same functions as the company headquarters of the headquarters and service company of the medical regiment.

The *battalion headquarters* performs the same functions as the regimental headquarters of the medical regiment.

The *general and medical supply section* performs the same functions as the general medical supply section of the headquarters and service company of the medical regiment.

The *motor maintenance section* performs the same functions as the regimental motor repair section of the headquarters and service company of the medical regiment.

The Collecting Companies. The medical battalion has three collecting companies, one collecting company providing the normal medical support for one infantry regiment. The individual collecting company performs the combined functions of a collecting company and the ambulance company of the medical regiment.

The collecting company is usually a *component of a combat team*. Most triangular divisions have organized "*combat teams*" consisting of a regiment of infantry, a battalion of light artillery, detachments of engineers and signal troops, and a collecting element, usually a company. A characteristic of these "combat teams is that the various components usually operate as a unit. The collecting element marches at the tail of the column and remains attached to the combat team until "march conditions cease." Ambulances are assigned to follow in the rear of each infantry battalion and artillery battalion during a march.

Standing operating procedures of divisions will vary, and officers with a division collecting company should be familiar with all such procedures which are in effect. If the company is assigned to a specified combat team, standing operating procedures may direct that the company commander report to the combat team commander for directions as to the location of an initial point, time of arrival at the initial point, place in the column, destination, and specific instructions as to the location of the company within an assembly area. Upon arrival in the assembly area, the company commander should report to the combat team commander for further orders or to obtain information regarding the tactical situation. Standing operating procedures for each collecting company should be developed, prescribing the exact actions of all key personnel, the loading of

equipment and personnel in specified vehicles, and the location of each vehicle in the company column.

The *company headquarters* of the collecting company of a medical battalion performs the combined functions of the battalion headquarters of the collecting and ambulance battalions of the medical regiment.

The *station platoon* performs the same functions as the station platoon (station section and liaison section) of a collecting company of the medical regiment.

The *collecting platoon* performs the combined functions of the litter bearer platoons of a collecting company and an ambulance company of the medical regiment. The *bearer*

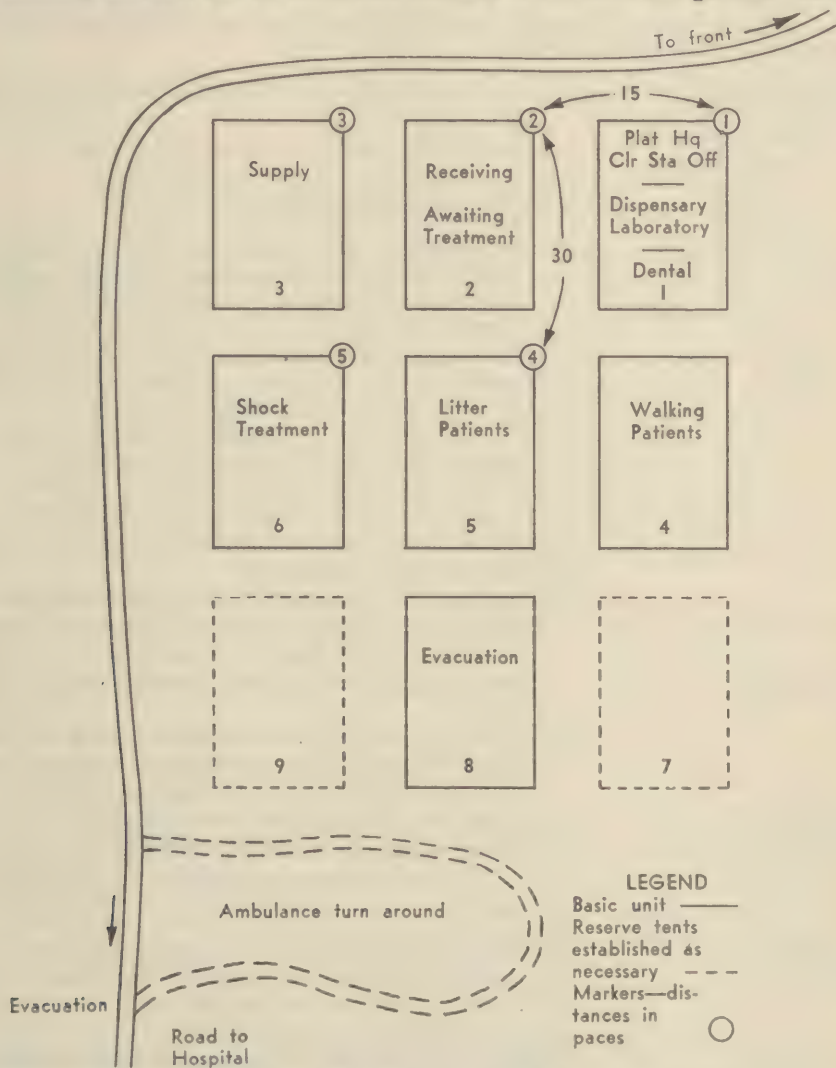


Plate 18. A Ground Plan for Clearing Station, Triangular Division.

section performs the same functions as the litter bearer platoons, and the *ambulance section*, in which there are 12 ambulances, performs similar functions to those of an ambulance company of the medical regiment.

The Clearing Company. The clearing company of the medical battalion performs the same functions as those of the clearing battalion of the medical regiment. Each platoon is

capable of operating a clearing station equipped to provide temporary shelter for 400 casualties.

The *clearing platoon*. The clearing platoon performs similar functions to those of a clearing company of the medical regiment. When the number of casualties demand the simultaneous operation of both platoons, urgent requests should be made to assistant chief of staff, G-4, to arrange for reinforcing elements from the army. The army may send forward a clearing platoon from the corps medical battalion or a clearing company from an army medical regiment.

The *clearing station* operated by the clearing platoon consists of nine tents, there being seven tents in the basic unit. Tents No. 7 and 9 are not set up unless necessary. (See Plate 18.) A suggested plan for the distribution of personnel of the clearing platoon in the clearing station is stated below:

TENT NO. 1

Platoon Headquarters }	1 Corporal—Platoon Clerk—Consolidated casualty records.
Clearing Station Office }	
Pharmacy-Laboratory	1 Private—Pharmacist-Laboratory Technician.
Dental Department	1 Private—Dental Technician.

TENT NO. 2

Admission	1 First Lieutenant, DC—Admitting Officer (sorting into litter, walking, shock cases, and priority removal to treatment departments) when not engaged in treatment GSW jaw.
	1 Staff Sergeant—General charge Enlisted Men—Charge admission during absence of dental officer.
	Supervision
	<div style="display: flex; align-items: center;"> <div style="border-left: 1px solid black; padding-left: 5px; margin-left: 10px;"> Property in Tent 3 Property Exchange in Tent 2 Admission Records Litter bearers Unloading ambulances </div> </div>
	1 Private—Clerk—Admission Records.
	1 Private—Property Exchange.
	4 Privates—Litter Bearers—Unloading Ambulances.
Awaiting Treatment	4 Privates—Litter Bearers—Transfer litter cases from Admission to Litter Patients Department.

TENT NO. 3

Supply	1 Private—Charge storage, issue supplies for use in station.
	1 Private—For transfer property exchanged in Evacuation Department (Tent 11) to property exchange at Admission Tent (Tent 2) or storage in Tent 3.

TENT NO. 4

Walking Patients	2 Captains/First Lieutenants/MC—Dressings.
	2 Privates—Assistants to Medical Officers—Give ATS.

TENT NO. 5

	2 Captains/First Lieutenants/MC—Dressings—Splints, etc.
--	---

Litter Patients
Department

1 Sergeant—Assistant to Medical Officers—General charge activities Enlisted Men in this Department.
1 Private—Assistant to Medical Officers.
1 Private—ATS—Preparation hypos.
1 Private—Dressed litters—Administration hot drinks.
4 Privates—Litter bearers—Transfer patients to Evacuation Department.

TENT NO. 6

Treatment traumatic shock	2 Privates—Transfer patients—Nursing—watch shock cases (supervised by Medical Officers) from Litter or Walking Departments.
---------------------------	---

TENT NO. 8 1 Sergeant—Sorting for ambulance evacuation.	
Evacuation Department	Supervision {
	Evacuation records Litter bearers Loading ambulances Property exchange
	1 Private—Evacuation records.
	1 Private—Property exchange.
	4 Privates—Litter bearers—Load ambulances—Transfer patients to reserve tents pending their evacuation.
Tents Nos. 7 and 9	
Reserve	For shelter of accumulated patients awaiting evacuation.
8 Privates—Chauffeurs }	Litter bearers and attendants—For transfer of patients from
7 Privates }	Evacuation Department to Reserve Tents—Loading ambulances—Simple nursing care of patients awaiting evacuation.

MEDICAL SERVICE WITHIN THE CAVALRY DIVISION

The basic principles governing the employment of the medical service with cavalry are similar to those which apply to infantry, but the method of application is often very different. The diversity and rapidity of cavalry action, the relative dispersion, the character of terrain over which cavalry may operate, the small size of medical units, all tend to accentuate the difference between what may be termed a normal or a diagrammatic employment of medical service and that which can be made to fit each different situation. With infantry, the normal may nearly fit at times; with cavalry, only rarely will it do so. Quick thinking, resourcefulness, and initiative are essential in the handling of cavalry. The same is true of handling the medical service with cavalry. It is even more essential here than with other arms that the medical officer thoroughly understand the nature of the operations of cavalry and actually be a part of the cavalry. For the organization and employment of the attached medical personnel (regimental medical detachments) of the cavalry division, see Chapter I.

Principles of Operation. Due to the mobility of cavalry elements and to the small number of medical personnel serving with cavalry, it is especially important to bear the following in mind in all echelons:

All medical personnel and units must ordinarily keep up with the organization which they serve.

The tendency to disperse medical personnel by attaching undue numbers to detached cavalry elements must be avoided. Medical personnel so dispersed is much less effective than if held in readiness for use as actually required.

The mobility of medical units should not be impaired by unnecessary supplies or equipment. Dependence should be placed on rapidly and systematically advancing supplies to the point of need.

Casualties in all echelons should be rapidly concentrated at collecting points on the axes of advance, from whence they can be taken over by supporting medical elements in the rear.

Measures for the temporary care of casualties, pending their evacuation, must be improvised by all medical units.

Cavalry requires the close support of medical units operating from the rear, in order that the command may not be burdened with casualties for the care of which but little if any means will exist.

Functions of the Division Surgeon's Office. The duties of the surgeon of a cavalry division closely parallel the duties of the surgeon of an infantry division. As division surgeon his office is at the rear echelon of division headquarters, but as the medical squadron commander during combat he spends most of his time at the division command post and in inspecting the operation of the medical service so that he may keep in touch with the quickly moving situation. As a staff officer in combat, he submits to the division G-4 the recommendation for divisional medical service. When this is approved he

turns it over, together with such other decisions as are necessary, to his staff of the medical squadron to prepare the field order. If time is available, the division surgeon may incorporate all of the above in an order, but these instructions will usually be in fragmentary form and will frequently be verbal. As commanding officer of the medical squadron, he issues the field order for the employment of his unit. This will usually be in the form of messages or verbal orders. The remainder of the personnel of the division surgeon's office functions the same as in the infantry division.

EMPLOYMENT OF THE MEDICAL SQUADRON

The medical squadron is intended to give medical service to the cavalry division similar to that which the medical regiment gives to the infantry division. It is an organic medical squadron. Each troop is motorized and each is so organized and equipped that it may establish two small stations if necessary. The organization and general functions of the medical squadron are related in Chapter II. The same general principles govern the location of medical installations that apply in the infantry division.

The cavalry division as a whole does not engage in mounted combat, but in dismounted or a combination of mounted and dismounted action. In dismounted action, it frequently covers a wide front which, by increasing the distances and intervals, renders the procedure for the care, collection, and evacuation of casualties usual in infantry forces exceedingly difficult or impracticable. In accompanying cavalry over difficult terrain, on raids, or in pursuit, special difficulties are presented for the division medical service. As the medical squadron must at all times be free to accompany a rapidly moving cavalry organization and as its facilities for evacuation and care of patients are very limited, it must be closely supported by medical units in the rear, which should be available to evacuate the clearing station rapidly or to take over the care of patients who have collected there.

In Camp

In camp or march bivouac the medical squadron performs the same duties as does the medical regiment of an infantry division.

On the March

March Casualties. March casualties among personnel may, if specifically required by conditions, be cared for by detailing ambulances with regiments or by establishing march collecting stations as with infantry. However, due to the fact that the command is mounted, such measures will not frequently be required, the ambulances normally accompanying the column for tactical purposes or the divisional ambulance service being sufficient. March casualties among animals may frequently require veterinary march collecting posts to be established by small detachments of the veterinary troop.

Advance Guard Detachments. Advance guard detachments of medical troops are not required as frequently with cavalry as with infantry, as the forces are smaller, there are fewer casualties to be expected, and the mobility of the advance guard elements, of the main body, and of the medical squadron, permits a more rapid arrival of medical units from the rear of the column. An advance guard of a reinforced regiment may at times require a detachment of approximately two ambulances and eight men of the collecting troop and four men of the veterinary troop, all under one officer.

Detachments for a March in Two Columns. If the march is in two columns, one column should be accompanied by a detachment of the collecting and veterinary troops, while the other column should have the remainder of the squadron. The clearing troop should not be split unless the two columns are so widely separated as to constitute virtually separate forces.

Division Widely Dispersed. When a considerable portion of the cavalry division is widely dispersed, as may happen on reconnaissance or counterreconnaissance missions, the medical squadron may move along or establish suitable elements on the axis of advance, near the main body. Casualties from the dispersed troops may then be collected daily or oftener by the collecting troop.

Marching with Service Trains. When marching, the medical squadron, less detachments, moves with the division trains until released.

In Combat

Whenever it is practicable, elements of the medical squadron should be placed in echelon behind the pivot of maneuver and along the main axis from front to rear. However, many situations will separate the pivot of maneuver and the maneuvering force by such great distances that it will be necessary to divide the collecting troop and establish a collecting station or collecting points with each of the two elements.

Employment of the Collecting Troop. The collecting troop consisting of troop headquarters and two collecting platoons, each composed of a collecting station section, a bearer section, and an ambulance section, with its equipment and personnel carried on motor vehicles, is capable of establishing two collecting stations. The troop commander is responsible for evacuation of squadron aid stations, providing a place of temporary treatment (collecting station), and evacuating collected casualties to the clearing station by means of motor ambulances. In an attack, its function is to establish a collecting station in rear of the divisional pivot of maneuver and promptly relieve squadron and regimental aid stations of their wounded. In addition, it must give service to the maneuvering force which may be a considerable distance from the pivot of maneuver.

The collecting station or stations. The exact location of the collecting station for the maneuvering force cannot be foreseen, but it is likely that it will handle the majority of casualties. One collecting platoon may be allotted to each force, or the platoon with the maneuvering force may be reinforced with additional personnel from the platoon with the pivot of maneuver. The collecting platoon with the maneuvering force should follow it into position, holding its station in readiness until the situation permits its establishment. When established, the location should be reported to the squadron commander. When the distance of the maneuvering force from the pivot of maneuver is great, then it may be preferable to attach a collecting platoon to the maneuvering force.

Ambulance service. In addition to providing litter bearer evacuation of aid stations, the collecting troop also provides motor ambulance evacuation to the clearing station. Each collecting platoon has eight ambulances. Ambulance service may be controlled either by the troop commander by pooling the ambulances of the two evacuation platoons, or in event of considerable distance separating the two forces, by the platoon leader of the evacuating platoons. This service is operated as in the ambulance company of the infantry division. When conditions permit, ambulances are utilized to assist in evacuation forward of the collecting stations from collecting points or even from aid stations.

In defensive action, when the defense is of short duration, the position weakly held, and in great width and little depth, casualties will be fewer. The designation of well-chosen collecting points and the use of ambulances ahead of collecting stations facilitate the collection of casualties. When the defensive measures are strong and protected, the collecting troop operates as does the collecting and ambulance companies in the infantry division.

In delaying action, the operations of the collecting troop are similar to those of a weak defense. Ambulances are pushed as far forward as possible to assist in evacuation. Collecting stations are kept mobile.

Employment of the Clearing Troop. The clearing troop is so functionally organized (See Chapter II) that each of its two clearing platoons is capable of providing a small clearing station. Initially, only one platoon establishes station, the other platoon being held in readiness to move either forward or to the rear, or provide additional beds, as the situation demands.

The clearing station or stations. The location of the clearing station depends upon many factors, such as the type of operation, road net, terrain, and enemy resistance. It should be beyond the range of hostile light artillery and convenient to the mass of expected casualties. The maximum use should be made of existing buildings to save time and labor and to provide shelter for such casualties and attendants as it may be necessary to leave behind until they can be evacuated by supporting medical service.

Employment of the Veterinary Troop. For organization, see Chapter II. The veterinary troop provides the evacuation and limited care and treatment facilities for animals as does the collecting and clearing troops for men. In combat, the third platoon (clearing) establishes the veterinary clearing station.

The veterinary clearing station or stations. The location of the veterinary clearing station depends upon the type of operation employed by the cavalry division. In general, the station should be located in proximity to the mass of expected animal casualties. The collecting platoons evacuate veterinary aid stations (See Chapter I) by means of lead lines. In situations where there is a pivot of maneuver and a maneuvering force, one clearing station may be assigned to evacuate each force.

Employment of Headquarters Detachment. For organization, see Chapter II. The headquarters detachment provides the operating personnel for the detachment and squadron headquarters. The medical and general supply section functions the same as the corresponding section in the Headquarters and Service Company of the medical regiment. The distributing point in combat is normally established in the vicinity of the clearing station established by the clearing troop.

MEDICAL SERVICE WITH THE ARMORED DIVISION

The armored division operates as five distinct and separate groups which will require medical support.

The reconnaissance battalion operates over wide areas at variable distances to the front or flanks.

The armored brigade organizes two combat teams, each composed of a light armored regiment, a medium armored battalion, one or two batteries of field artillery (each with 6 pieces), and a company of engineers.

The supporting echelon of the armored division organizes a combat team composed of the armored infantry regiment and field artillery battalion.

The service elements and trains in the rear areas are the other group.

Employment of the Armored Medical Battalion (FM 8-10). The medical battalion must be so disposed that casualties can be removed promptly from the medical units of lower echelons and transported to the clearing station.

The medical battalion provides medical support for each combat team. Elements of the medical battalion are not attached to the combat team so that the tactical units will not have the additional burden of directing the evacuation system in their area.

Employment of the Headquarters and Headquarters Detachment. The command post of the medical battalion is established in the vicinity of the division command post. This is a very mobile installation, usually remaining in the vehicles. It operates the battalion message center for the receipt, relay, and transmission of messages. Radio communication is maintained by sets operating in the division administrative radio net and the medical net for which frequencies have been assigned. Motorcycle messenger service is operated to the subordinate units.

The battalion commander, who is also division surgeon, normally accompanies the armored division command group and communicates with the battalion command post by radio or messenger.

A liaison party accompanies the armored brigade command group and remains in radio and messenger communication with the battalion command post.

The rear echelon of the medical battalion headquarters, the supply section, and the maintenance section are established near the clearing station.

The supply section rarely establishes advanced supply dumps for the mobile character of the action does not permit this. Light trucks, motor tricycles, and ambulances are available for the delivery of medical supplies to the subordinate units.

The maintenance section uses the location in the rear in which to operate but may send mechanics or the wrecker truck forward as needed on call.

Employment of the Collecting Company. The collecting company evacuates all casualties of the division and transports the casualties to the clearing station. Since the armored division frequently utilizes its mobility during the hours of darkness to improve its tactical dispositions or gain tactical surprise, this period will not be available for the collection of casualties.

The regimental medical detachments must be able to reach the successive assembly areas or rallying points within a short time after the combat vehicles arrive.

These factors dictate that very close support must be given the regimental medical detachments during the operation.

Company headquarters. The collecting company headquarters is established on the route of evacuation as far forward as the road net will permit.

The company commander assigns to his platoons or detachments the mission of evacuating casualties from units of the various combat teams.

Ambulances must be made available for the transportation of the medical personnel after each advance since the distances are too great for them to maintain contact by walking.

Collecting platoons. The collecting platoons are charged with the responsibility of evacuating the casualties collected within the combat team it supports and transporting them to the clearing station.

The platoon commander maintains liaison with the commander of the combat team he supports in order that timely information may be available to him upon which to base the employment of his platoon.

Whenever possible, groups of casualties are evacuated by ambulance to the clearing station. The terrain or tactical situation may make this impossible at times in the armored brigade, and frequently it will be impossible to reach the infantry battalion medical installation with ambulances. Under such conditions litter bearers are sent forward to evacuate the casualties by hand carry to an ambulance loading post located as far forward as the terrain and tactical situation permits.

The bulk of the ambulances are disposed as far forward as possible in order that the length of the shuttle may be reduced. Ambulances in the station are widely dispersed under cover.

All drivers must be qualified in map reading in order that they may be dispatched by map directions alone. The noncommissioned officers on motorcycles act as contact agents and control and direct the flow of ambulances to and from the various combat team areas.

The platoon headquarters, with a medical officer and sufficient men, operates mobile collecting stations to furnish medical attendance to those casualties who have not been treated by the attached medical personnel. The bulk of the casualties in this category will be found in disabled tanks. Such tanks are often located on exposed terrain where it is hazardous for the medical detachments to attempt early removal of casualties and to remain behind for this purpose will cause them to lose contact with the combat unit.

Platoons supporting the infantry-artillery combat team will establish a small collecting station from which litter bearers evacuate the aid stations.

Employment of the Clearing Company. The clearing company operates one or two clearing stations as needed, each platoon being capable of operating a separate clearing station.

Company headquarters. The company headquarters is located at the most advanced or most centrally located clearing station and maintains radio and motorcycle messenger communication with the battalion command post.

The company commander supervises the technical service of his platoons, conducts reconnaissance for new locations of the clearing station, recommends time and place for higher medical echelons to evacuate the clearing station, and directs the distribution of the company mess trucks so that each clearing station has hot food available as part of the treatment of the patients.

The company commander may direct one clearing platoon to reinforce another or move to a new location to receive casualties.

Normally the clearing platoons will be advanced singly. The forward platoon establishes station to receive casualties while the rear platoon clears its station and moves forward.

Clearing platoon. The clearing platoon establishes the clearing station, either alone or with the other platoon of the company.

Tentage is carried in which to shelter the station, but existing buildings should be utilized when available.

The clearing station should be located on a good ambulance road net to the front and rear to facilitate the transportation of casualties to the station and the evacuation of the station by corps or army ambulances.

Other considerations in the location of the station are:

Sufficiently far to the rear to be out of range of hostile light artillery fire, without unnecessarily lengthening the ambulance route to the front.

Away from the military objectives which are liable to attack by hostile aviation and artillery.

Within the area of the rear installations so that incidental protection may be received from combat elements in that area.

The conduct of the hostile force will dictate the course to be pursued as regards concealment of the station or placing it in the open with the red cross marker prominently displayed.

Water is essential to the station, and sewage facilities are desirable.

Operation. At this station, casualties of the armored division are collected for evacuation to the rear by higher medical echelons. The clearing station is not a place for definitive medical treatment.

The casualties received are sorted and those who can be returned to duty after treatment are not sent farther to the rear.

Emergency surgery only is performed in the station. All treatment is directed toward alleviation of suffering, prevention of shock, and preparation of casualties for further evacuation.

Every effort should be made to evacuate casualties as rapidly as possible, and priority is given the more serious cases who may be saved by early treatment at an evacuation hospital.

Mobility. It is essential that a certain degree of mobility be maintained by the clearing platoon. This is effected by a high degree of training of the personnel in establishing and closing the station, by establishing only as much of the station as is needed at the time, and by early calls for evacuation army medical units.

Whenever it appears probable that it will be necessary to move a station in operation in order to prevent its capture or to maintain contact with the division, this fact will be reported at once with the number of casualties in the station with a request for ambulances and empty vehicles to facilitate evacuation.

The more serious cases are transported in ward buses, the less serious cases in ambulances, and minor cases in available service vehicles.

Employment of the Medical Battalion on the March. The distances over which the armored division operates make it impracticable to evacuate march casualties to the site of the old clearing station.

March collection. Ambulances which are organically assigned to combat units are utilized to transport march casualties to "march collecting posts" which are established at intervals along the route.

March clearing station. Clearing platoons follow columns in march, taking over the casualties at the march collections posts, giving emergency treatment, and transporting them with the column in ward buses where treatment may be continued while in movement.

These casualties are returned to their organizations upon arrival at the next bivouac, if their condition permits, or evacuated to the rear at the first opportunity.

CHAPTER IV

THE MEDICAL SERVICE WITHIN THE CORPS AND FIELD ARMY

It is a doctrine that the higher echelon assume responsibility for evacuating casualties of men and animals from its principal subordinate units (see Plate 1); further, that the higher echelon will reinforce its principal subordinate units when their organic components are inadequate for conditions which arise or when unusually severe missions are assigned. The independent corps, for example, assumes responsibility for evacuating the clearing stations of casualties of the divisions which it includes; it reinforces the divisions with additional medical units when the medical means of divisions are inadequate. The field army, for similar reasons, evacuates the casualties from its several corps and divisions and furnishes reinforcements of additional medical means whenever the need exists. (See Plate 2). Casualties within a division are assembled at the division clearing station by medical personnel of the division, but they are cleared or evacuated from clearing stations by the medical units of the independent corps or by the field army. Reinforcing units may include surgical hospitals or an additional medical regiment or battalion as is indicated by the situation and the means for making reinforcements which the larger unit has available. For these reasons the organic strength of medical personnel of divisions can be kept at a minimum sufficient only for routine or normal missions. Aid from higher echelons will be usual in battle and campaign.

This chapter deals with the functions of medical units of the corps and field army (FM 8-15). The principles of supply and evacuation of large units are presented in Chapter VII, Part I. Tables of Organization of large units are shown in Chapter IV, Part I. The whole theory of reinforcing units is presented in Chapter V, Part I. Those chapters should be consulted as reference in the study of this subject.

THE CORPS MEDICAL SERVICE

Organization and Employment of the Corps Medical Service. The corps medical service is organized as follows:

Headquarters.

One medical battalion (T/O 8-65).

Medical personnel attached to corps troops.

Headquarters. The headquarters corps medical service may be divided into six sections with staff supervision of general functions as follows:

Administrative section. The corps surgeon is primarily concerned with the medical service of corps troops. He does not command the corps medical battalion, as it is provided with a commander. The corps except when acting independently, is not usually a link in the chain of evacuation. The corps surgeon, as a staff officer, has staff supervision of collection and evacuation within the component divisions of the corps as directed by the corps commander. He may act as the agent of the army surgeon in all tactical situations. He may act as the agent of the army surgeon in all Medical Department functions concerning the entire corps. Ordinarily, the corps surgeon supervises the division medical service only in so far as it is necessary to keep the army surgeon informed of conditions within the corps that affect the medical service. The corps surgeon assists the army surgeon by suitable recommendations.

Preventive medicine section. All matters pertaining to the prevention and control of disease; supervision of sanitation, field investigations, hygiene of food and water, and statistics of diseases and non-battle injuries. The corps medical inspector is responsible to the corps surgeon for the direction of sanitation among corps troops.

Operations and training section. Medical operations, training of medical troops evacuation and hospitalization, and reports and returns of battle casualties. The evacuation officer is concerned with the collection and temporary hospitalization of the sick and the battle casualties among corps troops; he arranges with the surgeon of the field army or of GHQ for their evacuation from the corps. He is also concerned with the medical supply of the medical detachments with corps troops.

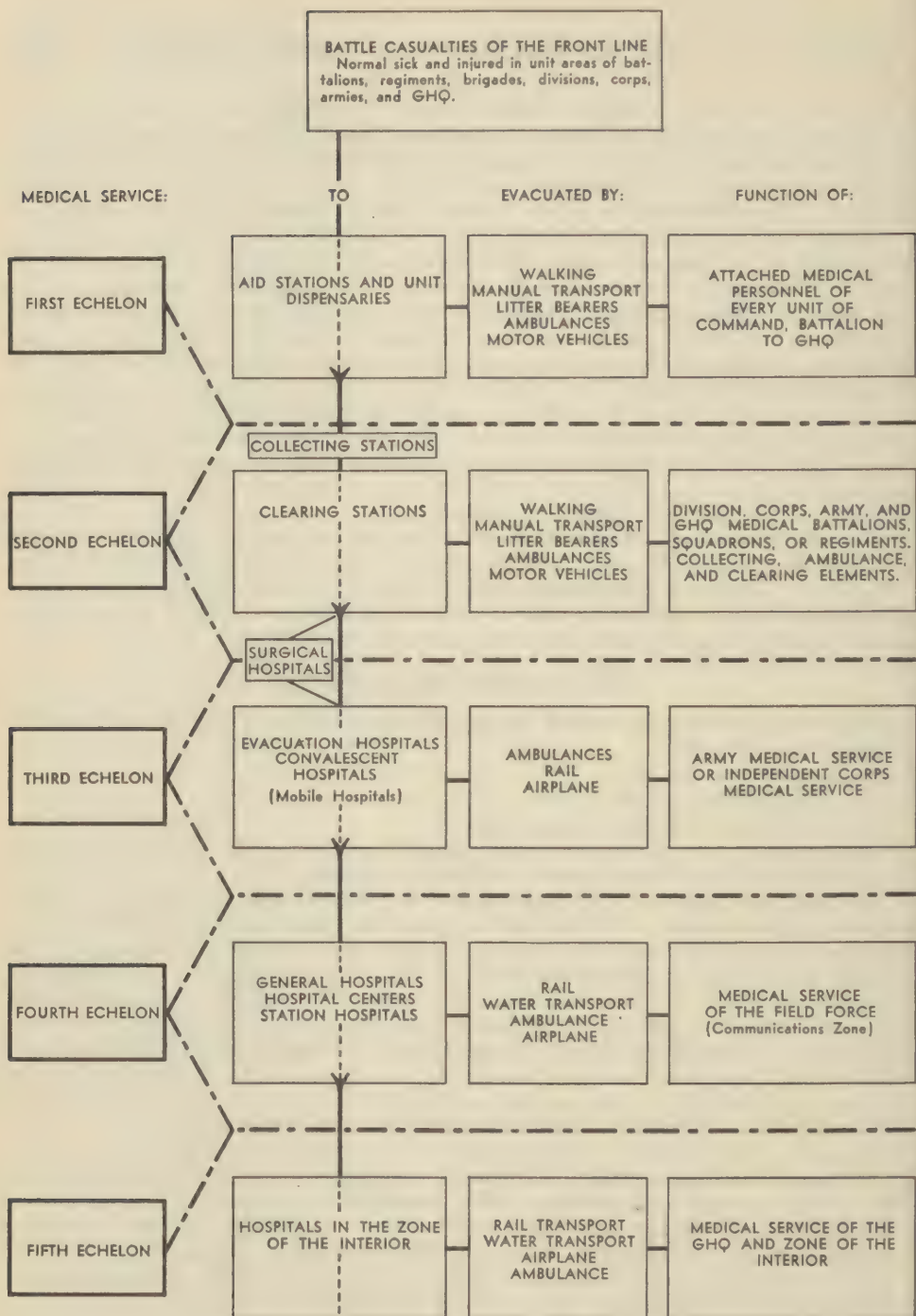


Plate 1. Classification of Field Medical Service by Echelons (Schematic).



Dental Section. The dental section includes the corps dental surgeon, who, under the corps surgeon, is concerned primarily with the administration of the dental service among corps troops.

Veterinary section. The veterinary section includes the corps veterinarian and his assistants. He is concerned with the administration of the veterinary service among corps troops. Although an assistant to the corps surgeon in his specialty, he may exercise staff technical supervision of the veterinary service in the divisions belonging to the corps in much the same manner as the corps surgeon may do for men.

Supply section. The supply section is concerned with the medical supply requirements of corps troops, supply inspections, and, when authorized, the allocation of supplies or supply credits among divisions and corps troops.

The Corps Medical Battalion. The corps medical battalion has the same general functions with relation to corps troops as the division medical regiment has to divisional troops, except that personnel for the corps surgeon's office is not attached to the regiment. In addition, the regiment may, when practicable, be used to augment or reinforce the medical service within the divisions of the corps. It is not, however, normally a link in the chain of evacuation from the divisions nor is it usually concerned with the medical supply of divisions.

The *battalion commander* utilizes the components of his battalion to accomplish the mission assigned him by the corps surgeon.

The *collecting companies* are utilized to assist in area sanitation, to establish corps collecting stations when necessary, to support or reinforce division collecting units; it may be used to assist in litter bearer work in evacuation and at surgical hospitals operating in advance of the corps rear boundary. The *ambulance sections* render local service for corps troops and may be used to reinforce the divisions or even to assist the army ambulance service during periods of stress. In an independent corps they are utilized to evacuate casualties from the clearing stations of divisions and corps troops to the evacuation hospitals.

The *clearing companies* establish clearing stations for corps troops and may relieve or reinforce the clearing units of division medical units. They may also be employed to care for slight, contagious, or gas cases, thereby relieving the divisions of this task. Clearing companies, augmented or otherwise, may also be used in lieu of surgical or evacuation hospitals when the corps is acting independently and the situation does not demand a large medical establishment. The trucks of corps clearing companies are sometimes used to transport the equipment of surgical hospitals within the corps zone when such units are attached to the corps.

The *headquarters detachment* distributes general supplies to the corps medical battalion and also establishes a distributing point for medical supplies for medical detachments with corps troops. When the corps is acting independently and an army depot or portion thereof is not attached, the headquarters detachments, reinforced or otherwise, may operate a corps medical park and distribute medical supplies to divisions. Medical supplies carried are limited to the capacity of the available transport. They are usually replenished from the army medical depot by sending trucks thereto. When on an independent mission, medical supplies may, however, be obtained direct from a designated communications zone depot through the regulating station.

The *veterinary company, separate* (T/O 8-99), if any, establishes a veterinary clearing station for corps troops. In an independent corps it may also be utilized to conduct veterinary evacuation from the divisions.

Regimental Medical Detachments with Corps Troops. These detachments function in the same manner as the regimental medical detachments of the infantry division.

General Functions of the Corps Medical Service. The corps medical service, when the corps is acting as part of a field army, has the following general functions:

Supervision of training of the medical personnel belonging to corps troops in accordance with the requirements of the army.

Sanitation of corps troops.

Collection and temporary hospitalization of sick and battle casualties among corps troops.

Utilization of the corps medical battalion to augment the army medical service and to assist the medical service within divisions.

The issue of medical supplies to corps troops.

Administrative functions relative to medical personnel of corps troops.

Attached Medical Department Personnel in Corps Troops. (See Chapter IV, Part I, "Organization of Large Units.") Medical Department personnel is attached to those units and functions in a similar manner to like units of the infantry division. See the Tables of Organization for strength and distribution of this personnel.

Army service area surgeon. The surgeon of the army service area, when such an area is established, is a member of the staff of the commander of that area. His functions are limited to the local administration of the medical troops, clearing stations, and other medical troops and of clearing stations and other medical establishments specifically assigned to the army service area command. His functions include local sanitation, supply, collection, and hospitalization of the troops belonging to the area command. These duties may be extended to cover the medical administration and local supply of units in the army service area for rest or training; but they will not extend to army medical units, established or in reserve in the army service area, that do not belong to the area command.

The Medical Service of an Independent Corps. When a corps is acting independently the functions of the medical service, including that of the corps surgeon, are similar to those of the army medical service. The corps medical battalion will generally be insufficient to provide adequate medical service for a corps in an independent campaign. In this case it is usually reinforced by additional medical units from the field army or GHQ reserves. These units may consist of an ambulance battalion or an entire medical regiment, a suitable number of evacuation hospitals and surgical hospitals, a portion of an army medical supply depot, and a veterinary company separate and a veterinary evacuation hospital.

Plan for the Corps Medical Service. In a corps which forms part of a field army, the plan of the corps surgeon for utilizing the corps medical service is generally limited to the measures he proposes to take for the collection, sorting, and temporary hospitalization of corps troops and the reserve he proposes to retain for support or reinforcement of the division medical services. The plan for the corps medical service is submitted as a recommendation to G-4 for coordination and for approval of the commanding general. Any movement orders necessary are then issued by G-3, although frequently the surgeon will draft the orders.

The first paragraph of the approved plan is incorporated and published in the corps administrative orders as part of paragraphs "1, Supply" and "2, Evacuation." This is all of the information of the medical service that the units of the corps require. Sub-paragraph "1, Supply," usually includes the location of the medical refilling point so that the corps and division medical units may know where to send for medical supplies. Sub-paragraph "2, Evacuation," includes the designation of the place or places to which the army will evacuate casualties from the corps and its divisions, but the number or designation of evacuation hospitals located thereat is not required. It also includes the location of the clearing station or stations for corps troops, and the designation of the point to which the army will evacuate animal casualties for corps troops.

The remainder of the plan is for the purpose of assigning more definite missions to the corps medical battalion. In doing this, latitude must be given the battalion commander. The corps surgeon must, however, insure that the necessary means are provided and must obtain authorization of G-4 for the use of roads, sites, and other coordination which may be necessary. Collecting stations for men are not usually required for corps troops, as casualties from the corps artillery and other units in the forward areas will generally be collected by ambulance direct from regimental or battalion aid stations or by division units. At the beginning of an action the collecting company of the corps medical battalion are usually held in reserve for support or reinforcement of divisions as may be required.

Medical plan of an independent corps. In an independent corps, with attached medical units, a portion of the medical plan is published in the administrative order, and the details of the plan are published as an annex to the administrative order as is done in the case of the army medical service.

MILITARY MEDICAL MANUAL

THE ARMY MEDICAL SERVICE

Organization of the Army Medical Service. The army medical service units for a type field army are shown in Chapter IV, Part I, "Organization of Large Units." The number of medical units actually assigned to an army may differ from the type army medical service due to variations in the combat forces, the situation, and the territory occupied. The army medical service is organized as follows:

Medical section of army headquarters, which includes the army surgeon and his commissioned and enlisted assistants.

Army medical units (type army):

3 medical regiments.	1 medical supply depot.
8 surgical hospitals.	1 attached veterinary company (separate).
10 evacuation hospitals.	1 medical laboratory.
1 convalescent hospital.	

Attached medical personnel of the medical detachments of army troops.

General headquarters reserve units—surgical, evacuation, and veterinary evacuation hospitals and teams from the auxiliary surgical group—are also assigned to field armies from time to time to reinforce the medical service as the need therefor becomes evident.

Attached Medical Department Personnel of Army Troops. The attached Medical Department personnel strength of army troops, exclusive of the attached medical personnel of the divisions and corps which are part of the field army, is in direct proportion to the number of auxiliary units assigned to the field army. Each of the units of the type army organization have a medical detachment to render first echelon medical service.

General Functions of the Army Medical Service. The army medical service has the following general functions:

The medical service of army troops. (See Plates 1 and 2.)

The supervision, coordination, and support of activities of the medical service of corps and divisions.

All movement and hospitalization of casualties between division clearing stations and the army hospitals.

The initiation of measures for the evacuation of casualties from the army area.

The procurement and issue of medical supplies for all troops in the army.

The sanitation of the army area, general supervision over the health of the command, and administration of the health service of the civil population of occupied territory pending a permanent organization.

The maintenance of records of sick, wounded, and dead.

The army surgeon. The army surgeon performs the functions of surgeon on the staff of the army commander and is the supply branch representative of the Medical Department within the field army. The army surgeon usually establishes his office at the rear echelon whenever army headquarters is divided. He also maintains a liaison officer at the forward echelon, maintains close personal liaison with it, or places a small portion of his office personnel near it. Establishments of the army medical service are usually moved on orders issued by G-3 on recommendations of the surgeon submitted to G-4. The surgeon, however, usually initiates all measures for coordination, the obtaining of transport, etc., and will frequently draft movement orders for the signature of G-3. Orders for the transfer of individuals, supply arrangements, and other administrative details within the army medical service may also be issued by the army surgeon in accordance with announced policies. Medical units of subordinate commands, such as corps and divisions, function directly under the commander thereof, the army surgeon exercising staff supervision of their technical operation only. When it is desirable to issue orders or instructions that could in any way conflict with functions of command, the army surgeon makes the necessary recommendations to the proper general staff section for incorporation in orders to be issued through the usual channels.

In his capacity as *technical adviser* to the army commander and his general staff on medical subjects he should be prepared to submit recommendations and plans for:

The technical training of all troops in sanitation, hygiene, and first aid.

The preservation of the health of the command.

The use of medical troops and establishments in any situation.

The coordination and execution of all matters relating to the duties of the medical service.

The replacement and assignment of medical personnel and units.

The supply of medical equipment and material.

As head of a supply branch, he is responsible that the needs for medical supplies are anticipated and that these supplies are at all times available for the troops for which they are intended.

In order to control and supervise all of the medical activities of the army as outlined above, the surgeon must keep himself informed of present and future operations and administrative plans; the positions and missions of the larger combat groups; location, status, and condition of units of the army medical troops; the location, number, and classification of casualties; and the enemy's medical activities and medical establishments. In order to secure this information, he keeps in close communication with the assistant chiefs of staff, requires periodical situation reports from his subordinates, and makes personal reconnaissance and inspections.

The army medical units are so disposed in all situations as to provide the necessary service in accordance with the tactical plans and in a manner which is most economical of transport and personnel. This is usually accomplished by distributing such medical units as are necessary for current or immediately foreseen needs, in positions from which they can readily care for the sick and the battle casualties of specific subdivisions of the army area. The remainder of the army medical units are grouped together, so far as is practicable, in order to facilitate administration, training, and control. The location of this group is such that the units will be readily available for use where needed as reinforcements or for advancement by bounds. The exact site for all units is usually determined by the relation of roads and railroads to the disposition of combat troops. The units which are established are located sufficiently close to the troops which they serve to permit of proper functioning, yet beyond the range of effective heavy artillery fire, and, so far as practicable, out of the area of congestion of combat troops. The reserve units are located in rear of the congested area and in active situations are held as nearly mobile as is practicable, that is, loaded on railroad cars or ready to load.

Plan for the Army Medical Service. In coming to a decision as to the utilization of the army medical service in a given situation, the army surgeon must make a complete estimate of all factors in the situation which affect that service. In combat, the basic factors in the estimate will usually be the type of operation contemplated, the mission assigned the larger elements, and when and where the greatest casualties are likely to occur. His decision is expressed in a plan which is submitted to G-4 for coordination and approval in the name of the commanding general. This plan should be specific, easily understood, and in such form that part of it may be incorporated without change in the army administrative order. It should also be in such form that it may be published as an annex to the administrative order with but slight modification. It is desirable also that the separate subparagraphs giving the missions to units of the army medical service be such that they can be used as drafts for movement orders with but slight modification. (See Chapter VII.) In actual warfare, a complete plan for an army engagement in one document will not often obtain. A general plan should always be possible, which may then be amplified by orders for individual units and instructions issued from time to time in accordance with the changing circumstances.

Medical Section of Army Headquarters. The medical section of Army headquarters provides a staff for the army surgeon in order that he may coordinate and direct the medical service within the army in accomplishing the functions listed above. There is no prescribed organization of this medical section. Because of the major staff functions of the army surgeon the following divisions of this section may serve as a guide:

Administration. This subsection is charged with all routine administration, personnel administration, and with the coordination of the other subsections.

Operations and training. This subsection should be under the supervision of a medical officer specially qualified in the military aspects of medical service. Several of the functions of the army surgeon are grouped into this subsection. The functions of this subsection include staff supervision of the following activities:

Training: Training of medical units and the training of all other units in personal hygiene and first aid. Training policies, programs, and inspections.

Employment of army medical units: Assignment of medical tasks to army medical units. Allocation of reinforcements to lower echelons. Movements of medical units and the locations of army medical installations.

Evacuation: Evacuation activities for men from the divisions back to the regulating station, coordinating all activities of the army medical regiments, evacuation hospitals, G-4, and the medical regulating officer. The evacuation officer often has his desk in the office of G-4 and acts as representative of the army surgeon.

Hospitalization: Supervision and administration of the care and treatment of sick and injured. The utilization of existing structures and facilities for hospitalization.

Consultants: Act in an advisory capacity to the army surgeon on professional matters and supervise the training of personnel in specialties and the treatment rendered in the hospitals of the army.

Supply. This subsection maintains statistical data relative to medical supply, estimates requirements, and supervises the procurement and distribution of medical supplies. It maintains liaison with G-4, the army depots, the regulating officer, and the communications zone medical supply agencies.

Dental. The army dental surgeon and assistant, under the direction of the army surgeon, supervises the dental service of the army as a technical service in the same general manner as it is done in the division.

Veterinary. This subsection coordinates and directs the operation of veterinary units of the army medical service and exercises technical supervision of veterinary activities in the corps and divisions. It supervises the evacuation of animals from the divisions back to the army veterinary hospitals and initiates measures for the evacuation of animal casualties from the army area. This subsection is in charge of the army veterinarian who has an assistant, the meat and dairy hygiene and forage inspector.

Enlisted assistants. Enlisted men are provided for distribution among the various sections.

Army Medical Regiments (T/O 8-11). Army medical regiments have the same functional organization as those of the infantry division, square. Three regiments are allotted to the type field army. They furnish medical service to army troops not otherwise provided for; then support and reinforce the medical service of infantry and cavalry divisions and the corps; further, they assist other units of the army medical service. Medical regiments are usually sent to a suitable central location and are ordered to cover a specified area such as a corps zone of action or all or a part of the army area in rear of corps rear boundaries. The manner in which the designated area is to be serviced is prescribed in general terms, or in detail, as required by the situation. The regimental commanders then distribute the elements of their regiments in such a manner as best to accomplish their missions. This may result in a wide separation of the various elements of the regiment.

Emergency evacuation stations may be established by detachments (collecting and clearing companies) of army medical regiments at points on railroads in advance of or removed from the evacuation hospitals when rail transportation is more available or more economical than movement by motor. These stations are particularly useful for slight and moderately severe cases who can be transported in flat cars or box cars when the advance of the main forces has left the evacuation hospitals well to the rear.

Headquarters and Service Companies. Each headquarters and service company serves its regiment and distributes medical supplies to medical detachments with army troops within the area serviced by the regiment.

Collecting battalions. The collecting battalions are used in the sanitary administration of the army area and in the collection of casualties from army troops. Collecting stations are often established for groupments of army artillery, but other collecting stations are not usually established for army troops. The collecting battalions may assist evacuation hospitals by furnishing litter bearers for handling patients entering and leaving the hospitals. They are also used for reinforcements and relief for division collecting battalions.

Ambulance battalions. The ambulance battalions, assisted in emergency by trucks or other available transportation, evacuate division, corps, and army medical regiment clearing stations and surgical hospitals, taking the patients to evacuation or convalescent hospitals or to emergency evacuation stations for transfer to an evacuation hospital by rail. It is usually necessary to employ for this purpose about one company per corps during periods of concentration or during a march and about one battalion per three division corps during combat. Army ambulance companies should begin to arrive at division clearing stations about three hours after combat begins and continue thereafter as rapidly as needed to clear the station. Such ambulances usually operate in convoy. Elements (platoons, sections, or companies) of an ambulance battalion may be used, when necessary, to transport patients in and about evacuation hospitals and are used as reinforcement or relief for division ambulance battalions. In addition, a few ambulances are required to evacuate army troops and reserve divisions in rear areas.

Clearing battalions. The clearing battalions furnish temporary hospital service to army troops and constitute a reserve to reinforce corps and division clearing stations or to relieve the same to permit of their forward movement. They may also be employed to care for slight, contagious, or gas cases, or be employed in lieu of evacuation or surgical hospitals when the situation does not demand a large establishment.

Surgical Hospitals (T/O 8-231). Surgical hospitals are allotted at the rate of 8 per type field army and have a capacity of 400 patients each. They furnish special facilities for immediate surgical aid to the more serious types of casualties. They are assigned to the immediate support of division clearing stations, from which they receive the non-evacuables or other serious cases, thereby freeing the stations for the reception of other patients or for movement. When once established, they remain in operation until patients are fit for evacuation. Patients are usually evacuated by ambulance to evacuation hospitals. Suitable buildings are desirable for their use, though they are equipped to be established in tents. Motor transportation is furnished by the army from the most available source for surgical hospitals which are not motorized. It will often be practicable to utilize trucks pertaining to established or reserve medical regiments. Surgical hospitals are held in reserve, usually with other medical units, and are so distributed as to be readily moved into position when required. When combat is imminent they are advanced by rail as far forward as suitable and are distributed ordinarily at the rate of one per front line division. They should be established on or near the main routes of evacuation and near lateral roads to adjacent divisions within two hours after combat commences. It is desirable that these points be immediately adjacent to the sites of division clearing stations. The specific locations are usually assigned on recommendation of the corps surgeon. Surgical hospitals are often turned over to the corps for movement and establishment, their location being reported to the army at once. They may also be attached to a corps. Although these hospitals are located in division areas, they usually remain under army or corps control in order not to hamper the movement of divisions. A surgical hospital may also be used to take over non-evacuable patients from an evacuation hospital so as to permit movement of the latter. It may also be used in lieu of an evacuation hospital when the situation does not demand the use of the larger establishment.

Evacuation Hospitals (T/O 8-232). (See Plate 3.) These hospitals are allotted at the rate of 10 per type field army. They have a capacity of 750 patients each and constitute the neck of the funnel through which all casualties must pass in their transit out of the combat zone to the fixed hospital of the communications zone. Military necessity demands a hospital of this size, one that is capable of rendering rapid and expert care and treatment for battle casualties. It must be so compact that it can be loaded, shelter and all, on a railroad train or motor-truck convoy. It should be able to establish and

1	Unit	2	Specialists' ratings (class)										Administrative service						Professional service					15	16	Remarks
1	Unit	2	Headquarters	Register and detach- ment of patients	Medical department personnel section	Receiving section	Evacuation section	Mess section	Supply and utilities section	Medical service	Surgical service ^a	Laboratory service	Rodentological service	Dental service	Total	Enlisted cadre	17									
2	Colonel.....	1								1	1				1			Includes— 1 chief of surgical service, 3 surgical teams, each consisting of— 1 operating surgeon, major, MC, 1 assistant operating surgeon, captain, MC, 1 anaesthetist, first lieutenant, MC, 1 nurse, 1 surgical technician, 3d class, 2 splint teams, each consisting of— 1 orthopedist, captain, MC, 2 surgical technicians, one 3d and one 4th class, 2 shock teams, each consisting of— 1 specially trained in the treatment of shock, captain, MC, 2 nurses, 2 medical technicians, one 3d and one 4th class, 1 plastic-maxillo-facial team, consist- ing of— 1 plastic surgeon, major, MC, 1 dental oral surgeon, major, DC, 1 nurse, anaesthetist.								
3	Lieutenant colonel.....	b 1									(d) 7				3											
4	Major.....	1								2	9	1	1	d 1	(d) 8											
5	Captain.....	e 1			e 1	1		e 1	f 1	3	5			d 1	(d) 20											
6	First lieutenant.....	e 1				1									(d) 13											
7	Second lieutenant.....								e 1						2											
8	Total commissioned.....	4	2	1	2	2	2	1	2	6	22	1	2	2	47											
9	Nurse.....														52											
10	Master sergeant, including.....	1													1	1										
11	Sergeant major (052).....	(1)													(1)	(1)										
12	First sergeant (385).....														1	1										
13	Technical sergeant.....														10	10										
14	Laboratory technician (051).....														(1)	(1)										
15	Male nurse (123) ^b														(8)	(8)										
16	Pharmacist (149) ^a														(1)	(1)										
17	Staff sergeant, including.....	1													7	6										
18	Chief clerk (052).....	(1)													(2)	(2)										
19	Clerk, general (055).....														(7)	(1)										
20	Mess (124).....														(1)	(1)										
21	Supply (186).....														(1)	(1)										
22	Technician, surgical (225).....														(2)	(1)										
23	X-ray technician (264) ^b														(3)	(1)										

[illegible]

The serial number symbol shown in parentheses is an inseparable part of the specialist designation. A number below 500 refers to an occupational specialist whose qualification analysis is found in section I, AR 615-26. A number above 500 refers to a military occupational specialist, listed in section II, AR 615-26.

Plate 3. T/O 8-232. Organization of the Evacuation Hospital, Field Army. (See next page.)

1		2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Unit		Specialists' ratings (class)	Administrative service							Professional service					Total	Enlisted cadre	Remarks
			Headquarters	Register and detach- ment of patients	Medical department	Receiving section	Evacuation section	Mess section	Supply and utilities section	Medical service	Surgical service *	Laboratory service	Radiological service	Dental service			
77	Private—Continued.	6th										(4)	(4)		(4)		
78	Technician, X-ray (264)						(4)					(4)	(8)		(8)		
79	Typist (247)						(17)					(12)	(20)		(20)		
80	Basic (521)		11			174						133			318	47	
81	Total enlisted.		15			190						212			417	47	
82	Aggregate.																
83	Car, light, 5-passenger, sedan		1												1		
84	Motorcycle, with side car		2												1		
85	Truck, 1½-ton, cargo						2								1		
86	Truck, 1½-ton, dump						1								1		
	Truck, 2½-ton, cargo						2								2		

Plate 3. T/O 8-232. Organization of the Evacuation Hospital, Field Army (Continued).

receive patients within 5 hours of the time of arrival at its selected site. It may have to receive its full patient capacity within 24 hours and perhaps evacuate four or five hundred patients to a hospital train in the same period. It should be able to clear patients, pack, load, travel, detrain, and establish in another location within 48 hours, under average conditions.

Purpose. Evacuation hospitals are established for the following purposes:

To provide facilities for major medical and surgical procedures in treatment of casualties (as near the front as practicable).

To provide definitive treatment as early as practicable.

To relieve combat troops of the burden of casualties.

To provide facilities for the concentration of evacuees so that mass evacuation by rail, motor, airplane, or water transport can be undertaken economically.

To prepare serious cases for further evacuation.

To remove from the chain of evacuation such casualties as are, or soon will be, fit for duty.

Employment. While evacuation hospitals are primarily for use during battle, they are also established to receive sick and injured from concentration or rest areas and from large marching columns when station or general hospitals are not available for this purpose. The principles underlying their location and operation are the same in essentials as when established for battle.

When battle is imminent, evacuation hospitals sufficient to meet expected needs (usually about one per front line division), are located and opened. A number are also held in army or G.H.Q. reserve, preferably loaded on railway cars. These evacuation hospitals in reserve are not established until the battle has developed to such an extent as to indicate where the bulk of the casualties are apt to be sustained. Evacuation hospitals are also held in reserve for employment when troops have advanced beyond the point where they can be served by established evacuation hospitals. They are not moved as frequently as the hospital stations of the divisions and corps and may operate in the same place for weeks. When once established during combat they are not moved unless the troops have advanced so far that it is more practicable to move the installation to the patients than it is to move the patients to the installation, or when the natural route of evacuation of wounded no longer passes near them.

The organic transport of evacuation hospitals is not sufficient to move the personnel and equipment. These hospitals must, therefore, be moved by rail or by motor transportation furnished by the army from the most available source. It is a function of the army surgeon to initiate arrangements for movement.

Location. Evacuation hospitals are normally located 8 to 16 miles from the battle front. They are established under tentage or in existing buildings, on a railroad leading to the rear, preferably on or near a siding capable of accommodating a hospital train (350 yards), and at a point where good roads lead from the battle front. They are sometimes established in groups where rail-siding and other facilities are ample. When possible they should not be located in the immediate locality of other army establishments because of the possibility of mutual interference in operation and in the use of rail-sidings, roads, and other facilities. They should not be separated from railroads except when they may be placed on a navigable stream with boats available for evacuation purposes. Evacuation hospitals receive patients, by ambulances, from division, corps, and army clearing stations and from surgical hospitals. The patient status of each established hospital is reported daily or oftener to the evacuation officer in the office of the army surgeon. The latter, through G-4 of the army, reports to the regulating officer (medical regulator) the number of patients in each established hospital who are suitable for evacuation. These reports, during active operations, will usually be direct requests to evacuate specific hospitals in a definite priority. The medical regulator assigns hospital trains, arranges their schedules, and advises the hospital and G-4 of the army of the probable time of arrival, the period of time allotted for loading (2 hours usually), and the class of cases that may be loaded on the train. During active operations these hospitals are evacuated rapidly and the stay of the average patient is short, while in quiet periods the reverse is the case.

Convalescent Hospital (T/O 8-233). The convalescent hospital (one per field army) receives slight and convalescent cases from evacuation hospitals and at times from division and corps clearing stations direct. Its functions are to relieve evacuation and other hospitals of the care of slight cases and venereals; to provide special treatment for convalescents; and, at the same time, to economize on transportation and to retain these patients under control of the army in order that they may be returned to duty with their organizations at the earliest practicable time. Patients fit for duty are turned over to

	1	2	3	4	5	6	7	8	9	10	11	12	13
	Unit	Specialists' ratings (class)	Headquarters	Clinical section				Convalescent section ^a		Detention section ^b	Total	Enlisted cadre	Remarks
			Medical service	Surgical service	Eye, ear, nose, and throat service	X-ray service	Dental service						
2	Colonel.....	1									1		† Insert number of hospital.
3	Lieutenant colonel.....	a1									1		^a Cadres for control and physical rehabilitation of the 6 convalescent companies.
4	Major.....		1	1	1		a1	1	1	6			^b Personnel for control and treatment of venereals.
5	Captain.....	a1	1	1	1	1	a1	1	1	8			^c Medical inspector and executive officer.
6	Lieutenant.....	a2	1				a2	6	1	12			^d Dental.
7	Total commissioned.....		5	2	3	2	1	4	8	3	28		^e Quartermaster Corps.
8	Master sergeant, including.....	1									1		^f Chaplain 1 medical administrative corps.
9	Sergeant major (052).....	(1)									(1)		^g Medical technologist.
10	Technical sergeant, including.....	2			4				2	8	4		Medical service includes—
11	First sergeant (585).....	(1)									(1)		1 major, chief of service (internist).
12	Laboratory technician (051). [*]				(1)						(1)	(1)	1 captain, assistant to chief (general medical).
13	Male nurse (123) [*]				(2)				(2)	(4)			Surgical service includes—
14	Pharmacist (149) [*]				(1)					(1)	(1)		1 major, chief of service (operating surgeon).
15	Supply (186).....	(1)									(1)		1 captain, assistant to chief (assisting operating surgeon).
16	Staff sergeant, including.....	1			1			6	2	10	7		1 lieutenant, anesthetist and assistant surgeon.
17	Clerk, chief (052).....	(1)						(6)	(1)	(7)	(3)		Eye, ear, nose, and throat service includes—
18	First sergeant (convalescent companies) (586).....												1 major, chief of service (otorhinolaryngologist).
19	Mess (124).....								(1)	(1)			1 captain, assistant to chief (assisting operating surgeon).
20	X-ray technician (264) [*]				(1)						(1)		1 lieutenant, anesthetist and assistant surgeon.
21	Sergeant, including.....	5			1			18	2	26			Eye, ear, nose, and throat service includes—
22	Duty (566).....	(3)			(1)			(12)	(2)	(18)			1 major, chief of service (operating surgeon).
23	Mess (124).....							(6)		(6)			1 captain, assistant to chief (assisting operating surgeon).
24	Supply (186).....	(1)									(1)		1 lieutenant, anesthetist and assistant surgeon.
25	Transportation (068).....	(1)									(1)		Eye, ear, nose, and throat service includes—
26	Corporal, including.....							6	2	8			1 major, chief of service (otorhinolaryngologist).
27	Duty (566).....							(6)	(2)	(8)			1 captain, assistant to chief (assisting operating surgeon).
28	Private, first class.....												1 lieutenant, anesthetist and assistant surgeon.
29	Private.....	41			29			29	37	45	17		Eye, ear, nose, and throat service includes—
30	Baker (017).....	3d	(2)								(2)		1 major, chief of service (otorhinolaryngologist).
31	Bugler (021).....		(1)								(1)		1 captain, assistant to chief (assisting operating surgeon).
32	Carpenter, general (050).....	5th	(1)								(1)		1 lieutenant, anesthetist and assistant surgeon.
33	Chauffeur (245).....	5th	(5)					(3)		(8)			Eye, ear, nose, and throat service includes—
34	Chauffeur (245).....	6th	(6)					(3)		(9)			1 major, chief of service (otorhinolaryngologist).
35	Clerk, general (055).....	5th	(1)							(1)			1 captain, assistant to chief (assisting operating surgeon).
36	Clerk, general (055).....	6th	(1)							(1)			1 lieutenant, anesthetist and assistant surgeon.
37	Clerk, supply (186).....	4th	(1)							(1)			Eye, ear, nose, and throat service includes—
38	Clerk, supply (186).....	5th	(1)							(1)			1 major, chief of service (otorhinolaryngologist).
39	Cook (060).....	3d	(1)					(6)	(4)	(11)	(1)		1 captain, assistant to chief (assisting operating surgeon).
40	Cook (060).....	4th	(1)					(6)	(4)	(11)	(1)		1 lieutenant, anesthetist and assistant surgeon.
41	Cook's helper (521).....	(2)						(6)	(4)	(12)			Eye, ear, nose, and throat service includes—
42	Mechanic, automobile (614).....	4th	(1)							(1)			1 major, chief of service (otorhinolaryngologist).
43	Mechanic, general (121).....	5th	(1)							(1)			1 captain, assistant to chief (assisting operating surgeon).
44	Motorcyclist (678).....	6th	(2)										1 lieutenant, anesthetist and assistant surgeon.
45	Pharmacist (149).....	3d	(1)							(1)			Eye, ear, nose, and throat service includes—
46	Pharmacist (149).....	4th	(1)							(1)			1 major, chief of service (otorhinolaryngologist).
47	Pharmacist (149).....	5th	(1)							(1)			1 captain, assistant to chief (assisting operating surgeon).
48	Stenographer (213).....	3d	(1)							(1)			1 lieutenant, anesthetist and assistant surgeon.
49	Technician, dental (067).....	4th			(1)					(1)			Eye, ear, nose, and throat service includes—
50	Technician, dental (067).....	5th			(1)					(1)			1 major, chief of service (oral surgeon).
51	Technician, dental (067).....	6th			(2)					(2)			1 captain, assistant to chief (assisting operating surgeon).
52	Technician, laboratory (051).....	4th								(2)	(2)	(1)	1 lieutenant, anesthetist and assistant surgeon.
53	Technician, medical (123).....	3d			(2)				(2)	(4)	(1)		1 lieutenant, anesthetist and assistant surgeon.
54	Technician, medical (123).....	4th			(2)				(4)	(6)	(1)		1 lieutenant, anesthetist and assistant surgeon.
55	Technician, medical (123).....	5th			(2)				(4)	(6)	(1)		1 lieutenant, anesthetist and assistant surgeon.

* This table supersedes T/O 285 W, approved February 23, 1927.

[illegible]

Page 4. T/O 8-233. Convalescent Hospital (Continued).

the army replacement battalion. This hospital is established in existing buildings if possible and is located centrally in the rear of army area on rail and road routes which connect with evacuation hospitals. It is moved only when necessary to conform to major changes in the location of combat troops.

Medical Supply Depot (T/O 8-235). This mobile unit (one per field army) is ordinarily moved by rail and established in the army area, usually in rear of the evacuation hospitals and centrally located with reference to the road net. It must have railway or water transportation connections with the regulating station and must be accessible to motor vehicles from army medical establishments and from division corps and army

	1	2	3	4	5														
	Unit	Specialists' ratings (class)	Medical laboratory ^a	Enlisted cadre	Remarks														
1																			
2	Lieutenant colonel.....		b1																
3	Major.....		(v1) c3																
4	Captain.....		(v2) d5																
5	First lieutenant.....		e1																
6	Second lieutenant.....		f1																
7	Total commissioned.....		11																
8	Master sergeant, including.....		1	1															
9	Senior laboratory technician.....		(1)	(1)															
10	Technical sergeant, including.....		4	4															
11	Laboratory technician.....		(4)	(4)															
12	Staff sergeant, including.....		3	1															
13	Chemical laboratory technician.....		(h1)																
14	First sergeant (585).....		(1)	(1)															
15	Technician, laboratory (051).....		(i1)																
16	Sergeant, including.....		7	1															
17	Mess and supply (186).....		(1)	(1)															
18	Technician, laboratory (051).....		(i1)																
19	Technician, laboratory (051).....		(k1)																
20	Technician, laboratory (051).....		(1 m 1)																
21	Technician, laboratory (051).....		(3)																
22	Private, first class.....		10																
23	Private.....		20	3															
24	Chauffeur (245).....		(5)																
25	Clerk, general (055).....	4th	(1)	(1)															
26	Cook (060).....	3d	(1)	(1)															
27	Cook (060).....	4th	(1)	(1)															
28	Motorcyclist (678).....		(3)																
29	Stenographer (213).....	3d	(1)																
30	Technician, laboratory (051).....	1st	(1 m 1)																
31	Technician, laboratory (051).....	2d	(1)																
32	Technician, laboratory (051).....	3d	(1)																
33	Technician, laboratory (051).....	4th	((1 m 1) 7)																
34	Technician, laboratory (051).....	5th	(3)																
35	Typist (247).....	5th	(1)																
36	Basic (521).....		(4)																
37	Total enlisted.....		45	10															
38	Aggregate.....		56	10															
39	Q Car, light, 5-passenger, sedan.....		1																
40	Q Motorcycle, with side car.....		3																
41	Q Semitrailer, laboratory.....		3																
42	Q Truck, 1½-ton, cargo.....		1																
43	Q Truck tractor, 2½-ton.....		3																
					<i>Summary of specialists' ratings</i>														
					<table><tr><th>Class</th><th>Number</th></tr><tr><td>1st.....</td><td>1</td></tr><tr><td>2d.....</td><td>1</td></tr><tr><td>3d.....</td><td>3</td></tr><tr><td>4th.....</td><td>2</td></tr><tr><td>5th.....</td><td>4</td></tr><tr><td>Total.....</td><td>13</td></tr></table>	Class	Number	1st.....	1	2d.....	1	3d.....	3	4th.....	2	5th.....	4	Total.....	13
Class	Number																		
1st.....	1																		
2d.....	1																		
3d.....	3																		
4th.....	2																		
5th.....	4																		
Total.....	13																		
					The distribution of enlisted specialists by grade is advisory only.														
					The serial number symbol shown in parentheses is an inseparable part of the specialist designation. A number below 500 refers to an occupational specialist whose qualification analysis is found in section I, AR 615-26. A number above 600 refers to a military occupational specialist listed in section II, AR 615-26.														

Plate 5. T/O 8-234. Organization of the Army (or Communications Zone) Medical Laboratory, Field Army.

medical regiments. The unit may be divided into sections to operate in several places, but only such sections of the depot are established as the situation may demand.

Functions. The army medical depot serves all units of the field army. It either procures or stocks articles of medical supply that are authorized for the units of a field army. The supplies maintained in army depots, however, are ordinarily limited in character and amount to those essential to maintain combat efficiency for a period not exceeding three days. The articles actually stocked by army medical depots are, therefore, those that require frequent replenishment. An army depot requisitions supplies, through the army surgeon and G-4, from a designated communications zone depot, and the supplies are received therefrom through the regulating officer. The depot issues direct to army establishments (evacuation hospitals, etc.) and issues to the headquarters and service companies of army, corps, and division medical regiments who in turn distribute to organizations which they serve. Units drawing supplies from an army depot ordinarily send for them by their own motor transport. Medical supplies may also be sent direct from communications zone depots to evacuation hospitals, the convalescent hospital, or other large units located at railheads. Carload lot shipments may thus be expedited. Less than carload lot shipments are sent in this manner only when speed in supply is of reduced importance; that is to say, when troops are not in contact with the enemy or in stabilized or semi-stabilized warfare. If this method is used it is necessary that all such supplies be requisitioned through the army medical depot and that delivery be acknowledged to the latter, even though the supplies do not pass physically through the depot. Medical supply within the army is controlled directly by the supply officer in the army surgeon's office, subject to coordination with G-4 of the army. During combat, requisitions are usually informal.

The Army Medical Laboratory (T/O 8-234). (See Plate 5). This unit (one per field army) establishes a stationary laboratory which is ordinarily located in a central position in the rear part of the army area. It also provides three mobile sublaboratories. The stationary laboratory is usually moved only when necessary to conform to major changes in the location of combat troops. Its principal purpose is to serve as an agency with which the army medical inspector can conduct epidemiological investigations within the army area. The sublaboratories are detached from time to time for this purpose. The unit functions include routine water analyses, laboratory investigations in connection with epidemiological surveys, and distribution of special laboratory supplies.

The Army Veterinary Service. Veterinary service when necessary is included in the army medical service. The functions of the veterinary service and the system of veterinary hospitalization and evacuation parallel, in general, those of the medical service in the care of men. The methods of animal hospitalization differ, however. At all points in the movement of disabled animals from front to rear, the question arises as to whether destruction or evacuation is indicated. The veterinary service also inspects forage, meats, and meat and dairy products. For schematic diagram of the veterinary service in the army, corps, and division, see Plate 6.

Veterinary Company, Separate (T/O 8-99). (See Plate 7). The veterinary companies attached to the field armies by GHQ provide evacuation of animals as required to meet the needs of troops not otherwise provided for. These units may be located in advance of the veterinary evacuation hospitals. The companies may also be used to augment the veterinary evacuation hospitals by attaching them to the latter or by having them establish emergency evacuation points for animals.

When divisions (such as cavalry) are provided with a second echelon of veterinary service, elements of the veterinary company (separate) take over the animal evacuees at the veterinary clearing stations. Otherwise, animal casualties are taken over by the veterinary company (separate) at unit veterinary aid stations. (See Plate 5.)

The veterinary company (separate) has sufficient organic transport to move its personnel and matériel.

	1	2	3	4	5	6	7	8
	Unit	Specif. Serial Number	Spec. Ratings (class)	Company Headquarters	1 Platoon (a)	Total 5 Platoons	TOTAL COMPANY	Enlisted Cadre
2	Captain			1			1	
3	First lieutenant			1	1 ^h	5 ^h	6 ^{sh}	
4	Total commissioned			2	1	5	7	
5	Technical sergeant			1			1	1
6	First sergeant	(585)		1 ^h	1	5	(1)	(1)
7	Staff sergeant, including						7 ^{1h}	2
8	Platoon sergeant	(651)			(1)	(5)	(5)	
9	Stable sergeant	(210)		(1) ^h			(1) ^h	(1)
10	Supply sergeant	(186)		(1)			(1)	(1)
11	Sergeant, including			?	5 ^h	15 ^h	17 ^{1sh}	1
12	Section leader	(652)			(3) ^h	(15) ^h	(15) ^h	
13	Mess	(124)		(1)			(1)	(1)
14	Motor	(068)		(1)			(1)	
15	Corporal			1	8	15	16	1
16	Assistant section leader	(652)			(3)	(15)	(15)	
17	Company clerk	(655)		(1)			(1)	(1)
18	Private, first class, and						48 ^{17h}	8
19	Private, including:			10 ^{2h}	25 ^{sh}	125 ^{1sh}	96	3
20	Bugler, also acts as messenger	(021)		(1)			(1)	
21	Chauffeur	(245)	5th	(1)	(2)	(10)	(11)	
22	Chauffeur	(245)	6th	(1)	(2)	(10)	(11)	
23	Clerk	(055)	6th	(1)			(1)	
24	Cook	(060)	3d	(2)			(2)	
25	Cook	(060)	4th	(2)			(2)	
26	Cook's helper	(521)		(3)			(3)	
27	Horseshoer, clinical	(094)	3d		(1) ^h	(5) ^h	(5) ^h	(1)
28	Mechanic, auto	(014)	3d	(1)			(1)	
29	Mechanic, auto	(014)	4th	(1)			(1)	
30	Motorcyclist	(678)	5th	(1)		(2)	(3)	
31	Motorcyclist	(678)	6th		(1)	(3)	(3)	
32	Orderly	(622)		(3) ^{2h}			(3) ^{2h}	
33	Orderly, ambulance, vet.	(696)			(9)	(45)	(45)	
34	Orderly, stable	(697)			(1)	(5)	(5)	
35	Technician, surgical, vet.	(226)	3d		(1) ^h	(5) ^h	(5) ^h	(1)
36	Technician, surgical, vet.	(226)	4th		(1)	(5)	(5)	(1)
37	Technician, veterinary	(250)	4th		(1) ^h	(5) ^h	(5) ^h	(1)
38	Technician, veterinary	(250)	5th		(1)	(5)	(5)	(1)
39	Technician, veterinary	(250)	6th		(2)	(10)	(10)	(1)
40	Basic	(521)		(2)	(3)	(15)	(17)	
41	Total enlisted			25	32	160	185	11
42	Aggregate			27	33	165	192	11
43	Q-Animals, including			3	13	65	68	
44	Horse, draft				(6)	(30)	(30)	
45	Horse, riding			(3)	(7)	(35)	(38)	
46	Q-Motorcycle, with side car			1	1	5	6	
47	Q-Trailer, tank, water, 250-gal.			1			1	
48	Q-Truck, 1½-ton, command			1			1	
49	Q-Truck, 1½-ton, cargo			1	1	5	6	
50	Q-Truck, 2½-ton, with stock rack body				3	15	15	

Tentative T/O. Oct. 7, 1940, as used at Medical Field Service School. This table supersedes T/O 8-99, May 1, 1939.

6

REMARKS

^a Normally one platoon will be required to evacuate from each Army Corps and each Cavalry division. Each platoon may be divided into 3 sections, one for each Infantry division.

^b Mounted on horse.

Summary of Specialists Ratings:

Class	No.
3rd	13
4th	13
5th	19
6th	25
Total	70

The serial number symbol shown in parenthesis is an inseparable part of the specialist designation. A number below 500 refers to an occupational specialist whose qualification analysis is found in Section I AR 615-26. A number above 600 refers to a Military occupational specialist, listed in the Index, Section II, AR 615-26.

CHAPTER V

THE MEDICAL SERVICE OF A FIELD FORCE

Introduction. This chapter seeks to formulate the responsibilities of the Medical Department in a field force and to describe the organization and the operation of the agencies provided by laws, regulations, and plans for such purpose. This service must be organized and shaped in general conformity with Tables of Organization (See Chapter IV, Part I.) prescribing the forces and the specific war plan covering the enterprise for which the force is created.

Behind the tactical units lie the important activities of the Medical Department designed to provide for the definitive treatment and the ultimate care of war casualties. Being predicated upon the general mobilization plan and the specific war plan involved, the organization and operation of the Medical Department within the field force must be coordinated with the general policies of The Surgeon General in providing the medical service within the zone of the interior. This will involve matters of personnel incident to mobilization not only of the field force but of that part of the home population which will be militarized; it will include also the general plan for medical attendance, hospitalization, and sanitation and the procurement, distribution, and replenishment of medical, dental, and veterinary supplies.

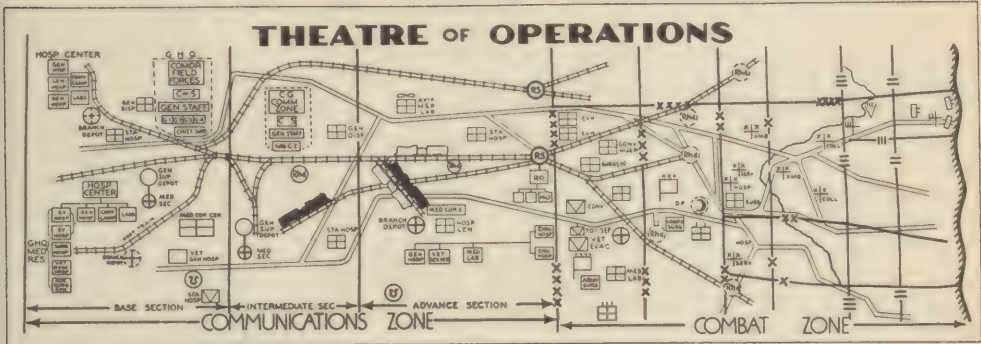


Plate 1. Medical Service within the Theatre of Operations (Schematic).

ORGANIZATION

General Plan of Organization. Based upon the above plans and policies there must be worked out the organization of the Medical Department within the force, including the organization of the office of the chief surgeon and of the surgeon of the communications zone and its various sections, if there be any, and the necessary contact with the general staff and the surgeons of the armies or groups of armies in order to establish the means of controlling the activities of the Medical Department within the force. These will include, in general, all activities which have their counterpart in the medical service of the zone of the interior, such as personnel, medical attendance, sanitation, equipment and supply, but with added attention necessary in the matters of the strategical distribution of medical units, equipment and supplies, the utilization of specialized personnel, and the formulation of policies regarding professional treatment and the all important matters of evacuation and hospitalization.

The Medical Service Functions. The Medical Department within a field force is classified as one of the technical, supply, and administrative services. As such its functions are as follows:

General functions. The preservation of the strength of the forces in the field, accomplished by the care and treatment of the sick and injured men and animals of all military forces and the conversion of casualties into replacements whenever possible.

Specific functions. The specific functions of the Medical Department are:

The initiation of sanitary measures to insure the health of troops.

- The direction and supervision of all public health measures among inhabitants of occupied territory.
- The care of the sick and wounded men and animals, in camp, on the march, on the battlefield and after removal therefrom.
- The methodical disposition of the sick and wounded, so as to insure the retention of the effectives and to relieve the fighting force of the non-effectives.
- The transportation of the sick and injured.
- The establishment and operation of hospitals, dispensaries, and other installations necessary for the care of the sick and injured.
- The supply of material necessary for the prevention of disease among the troops and for the care of the sick and injured.
- The preparation and preservation of records of sickness and injury, for the immediate information of higher authority and to assist in the adjudication of claims with justice both to the government and to the individual.

Chief Surgeon's Office, General Headquarters. In time of threatened war, the War Department, upon the recommendation of The Surgeon General, assigns a medical officer, who is acceptable to the commander of the field force, as chief surgeon. This officer becomes a member of the "special staff" of the commanding general of the field force. Under the commanding general he controls all Medical Department activities within the theatre of operations through the coordination of the general staff at general headquarters (GHQ).

The functions of the Medical Department are so intimately connected with combat activities that its primary classification as a supply-administrative service is unwarranted. The providing of medical supplies is but a small part of its many functions. It is, therefore, necessary that the chief surgeon maintain his office at GHQ in order that he may keep in close touch with the commander in chief and his general staff. As the GHQ is concerned with broad matters of policy and strategy, rather than with the details of administration and operation, the chief surgeon's office is organized so as to fulfill its staff functions chiefly through direct cooperation with the divisions of the general staff at that headquarters. For this purpose, a medical officer or group of officers may be assigned to maintain immediate liaison with each division of the general staff liaison officers. While so serving, they may be actually located in the office of the chief surgeon or in the general staff offices, according to the policy announced by GHQ. Questions arising within all sections that in any way affect the Medical Department should come before these officers for comment before being finally decided, and their recommendations should be in accordance with the policies of the chief surgeon. So much of all plans for the future as affect the Medical Department must be given these officers.

The chief surgeon must spend much of his time away from GHQ, for only in this manner can he keep himself well informed as to the status of the medical service in the theatre of operations. Therefore, it is necessary for him to have an assistant at GHQ, who is the deputy or assistant chief surgeon of the force and who acts for the chief surgeon when he is absent. This assistance should be a medical officer of wide experience and one who is familiar with general staff work.

Units under immediate control of the chief surgeon. The chief surgeon keeps under his immediate control (usually at the Medical Department Concentration Center) such medical units as he wishes to hold as GHQ reserves for the purpose of augmenting the medical service within a particular army. These reserve units include *evacuation hospitals, surgical hospitals, veterinary evacuation hospitals, and auxiliary surgical groups*. The first three mentioned are army units primarily and are discussed in Chapter IV.

The *Auxiliary Surgical Group* (T/O 8-512) is a GHQ reserve unit. These groups are authorized at the rate of one per army in the field. The teams constituting them are employed at hospitals either in the combat zone or communications zone, wherever their services are needed, but particularly to augment the personnel of evacuation and surgical hospitals of an army. In each surgical group there are an *administrative headquarters, surgical teams, splint teams, shock teams, gas teams, maxillo-facial teams, research teams, and other teams for miscellaneous assignment*. The teams are organized so

as to permit them to be sent equipped for work on short notice to any part of the front or to the rear. The personnel is specially selected for their professional attainments.

The *Medical Department Concentration Center* (T/O 8-505) is also a GHQ reserve unit, although its local administration may be supervised by the surgeon of the communications zone. This unit provides the administrative overhead for the units in GHQ reserve and for Medical Department replacements. A center of this character permits units to be prepared for service, overhauled, and refitted under coordinated control at one place when they come off the line, instead of being scattered by single units throughout the theatre of operations. This concentration of units also facilitates the solution of supply and replacement problems.

The Medical Headquarters GHQ. The medical headquarters at GHQ consists of:

Chief surgeon. The chief surgeon has general control of Medical Department activities and of policies which concern the department.

Deputy or assistant chief surgeon. The deputy or assistant chief surgeon acts for the chief surgeon when he is absent.

Liaison with general staff sections. Medical officers are detailed for liaison with the general staff sections as follows:

One for *liaison with the personnel section (G-1)* who is concerned with medical replacements, sanitation, and sanitary inspections, including those necessary in the administration of military government of occupied territory, casualty records, and general activities of the Red Cross.

One for *liaison with the intelligence section (G-2)* who is concerned with military intelligence of value to the Medical Department.

One for *liaison with the operations and training section (G-3)* who is concerned with movement orders of all Medical Department units and all matters of organization and training pertaining to the Medical Department.

One for *liaison with the supply section (G-4)* who is concerned with matters dealing with evacuation, hospitalization, and medical supply for men and animals; Red Cross hospital and supply activities and Medical Department troops in general headquarters reserve.

The chief veterinarian acts as supervising head of the veterinary service.

Other Assistants to the Chief Surgeon. The following, while operating directly under the office of the chief surgeon, are located in the Medical Department Concentration Center or other convenient points:

Chief of professional services. The chief of professional services coordinates the activities of the medical, surgical, dental, and aviation medical services, but solely in an advisory capacity.

Consultants and assistants. Consultants and assistants include such other commissioned personnel as may be necessary to insure efficient operation of the medical service.

The role of the medical groups assigned to regulating stations which are established and administered under the direction of G-4, GHQ, is discussed under the heading "Regulating Station," below.

The Surgeon, Communications Zone. At the headquarters of the communications zone, a medical officer is detailed on the staff of the commanding general as the surgeon, communications zone.

The officer, under the commanding general, supervises Medical Department activities within the communications zone. He has under his supervision all medical units in that zone except those retained under the direct control of the chief surgeon of the field force. The units under the direct supervision of the surgeon, communications zone, are *general hospitals, hospital centers, convalescent camps, general dispensaries, the general medical laboratory, the communications zone laboratories, veterinary general hospitals, and those hospital trains* which are assigned for his use. He maintains technical supervision over medical sections of general supply depots, station hospitals, veterinary station hospitals, and other Medical Department activities under the control of local commanders.

The Office of the Surgeon, Communications Zone. The office of the surgeon, communications zone, is organized on a functional basis, i.e., into sections concerned with the several activities that together comprise the responsibility of the Medical Department as

an administrative, technical, and supply service. Activities of the Medical Department are coordinated through the general staff of the communications zone. Liaison with the general staff sections, on important matters, is conducted by the chiefs of sections of the office of the communications zone surgeon. Every officer, however, whether he is a section chief or not, should maintain active liaison not only with the general staff officers in matters with which he is concerned but also with the representatives of other supply branches, e.g., the Quartermaster, Engineer, etc.

The sections and sub-sections of the surgeon's office, communications zone, with duties assigned to each are as follows:

Administrative section. This section supervises the operation of the entire office. Its personnel includes the surgeon, the deputy surgeon, and the office executive. It may have subsections as follows:

The *office service subsection* deals with the interior office administration such as filing, records, receipt and dispatch of official mail, courier service, information, printing, mimeographing, and stenographic work.

The *detachment subsection* administers, as a company or detachment, the enlisted men on duty in the office. It details chauffeurs, orderlies, clerks, etc., for the various sections and keeps the personnel records and the reports of the enlisted men who are members of the organization.

The *historical subsection* formulates the plans for collection of historical data and maintains liaison with all other agencies concerned with the collection and preparation of histories, especially the historical branches of general staff sections.

Hospitalization section. This section will usually be the largest and most important as it controls the majority of the fixed hospitals of the communications zones. The section will usually have the following subsections:

The *procurement and construction subsection* deals with hospital projects; transfer of hospitals and property from civil ownership to the Medical Department and vice versa; offers of land and buildings for hospital purposes; leasing of lands and buildings; making inventories of the same; hospital plans and construction in liaison with the chief engineer; repairs to hospitals; procurement and distribution of tentage; coordination with the "Rents, Requisitions and Claims Bureau" and Quartermaster Corps; reference maps and graphic charts of projects completed, under construction, and proposed; and inspection and reports relating to the above items.

The *administration subsection* supervises the administration of the hospital centers, general hospitals, convalescent camps, and any other fixed hospitals that may be established under the direct control of the commanding general of the communications zone.

Supply section. The supply section functions under the supervision of a medical officer experienced in all phases of supply work. He and his assistants maintain the necessary statistical data, estimate requirements, and conduct procurement, storage, and distribution of supplies. They maintain liaison with the general staff sections at the several headquarters dealing with matters pertaining to supply. This office may be divided into the following subsections:

The *statistics and requirements subsection* deals with statistical data, issues experience and consumption tables and all information upon which automatic supply or procurement may be based.

The *procurement subsection* deals with the obtaining of supplies by automatic replacement or requisition from the zone of the interior, local purchase or transfer from the Red Cross or an allied power or captured enemy material.

The *storage and distribution subsection* deals with all matters pertaining to the storage and distribution of medical supplies.

The *finance and accounting subsection* is in charge of a medical department officer experienced in military auditing, accounting, and disbursement. He and his assistants supervise, control, or conduct the financial transactions of the chief surgeon's office and all Medical Department functions controlled by it. This subsection may be further divided as follows:

Allotment and disbursing: Dealing with the accounts of available funds, the allocation of funds to projects and the allotment of funds to medical supply or other Medical Department officers for the local purchase of supplies or service, and the handling of disbursements and disbursing accounts.

Auditing: Dealing with the examination of money vouchers in connection with the procurement of supplies or services and the final audit of hospital or other fund statements or accounts pertaining to the Medical Department under the control of the surgeon, communications zone.

Legal: Furnishing legal advice on matters in connection with the activities of the supply and finance divisions with special reference to claims, contracts, and leases.

Personnel section. The personnel section deals with all matters relating to appointment, assignment, transfer, promotion, and returns of personnel. It is important because the functioning of all units of the field force depends upon its conduct. It may be subdivided into the following subsections:

Commissioned:

Medical Corps

Dental Corps

Veterinary Corps

Medical Administrative Corps

Sanitary Corps

Nurse Corps.

Enlisted men of the Medical Department.

Civilian employees of the Medical Department.

Evacuation section. This section deals with primary, secondary, and special evacuation of sick and wounded; transportation and assembly of special classes of patients; estimates of transportation required for sick and wounded; records and statistics of evacuation; hospital train assignment and the use of light railways and waterways.

Sanitation section. This section deals, generally, with all matters pertaining to health and control of disease within the communications zone. Through subordinate agencies, it initiates or directs the execution of special disease-control measures, the conduct of epidemiological studies and procedures for the control of existing or potential epidemic conditions. It exercises general supervision over sanitation by means of sanitary inspections and surveys and promulgates special instructions relative to measures to be taken for the prevention of disease. It also supervises the operation of medical laboratories.

Vital statistics section. This section deals with inspection, correction, and compilation of all statistical data relating to the sick and wounded and correspondence pertaining thereto.

Consultant section. The consultant section acts as an agency in carrying out the policies formulated by the chief of professional services on the staff of the chief surgeon, GHQ. The section must function in cooperation with the hospitalization and personnel section and also with the Medical Department Concentration Center. The officer in charge should possess a wide knowledge of the professional qualifications of the large number of civilian practitioners of the United States who come into active service in time of war in order that assignment may be made in accordance with professional qualifications. It will usually have two subsections: *surgical and medical.*

It is imperative that each subsection be supervised by officers who are pre-eminent in that particular branch of medicine and who at the same time possess administrative ability. These officers, in addition to routine duty, prepare the bulletins issued from time to time by the chief surgeon which announce the latest approved methods of technique and treatment for the information of the medical officers of the field force.

The *surgical subsection*, under the supervision of a medical officer of the highest surgical attainments, may be subdivided as follows:

General Surgery

Urology

Orthopedics

X-ray

Nerve and brain surgery

Ophthalmology

Maxillo-facial surgery

Oto-laryngology

The *medical subsection*, under a medical officer of high professional attainments, may also be subdivided as follows:

General medicine

Neuro-psychiatry

	1	2	3	4	5	6	7	8	9	10											
1	Unit	Specialists' ratings (class)	Headquarters section	Medical section	Surgical section	Eye, ear, nose, and throat section	Dental section	Total	Enlisted cadre	Remarks											
2	Lieutenant colonel.....		1					1		a Medical Administrative Corps. b Medical technologist. c Dental. d Medical service includes— 1 major, chief of service. 1 captain, internist. 1 lieutenant, general medical. Surgical service includes— 1 major, chief of service. 1 captain, general surgeon. Eye, ear, nose, and throat service includes— 1 captain, chief of service. 1 lieutenant, oculist. Dental service includes— 1 major, chief of service. 1 captain, assistant chief of service, oral surgeon. 1 lieutenant, general operator. The distribution of personnel indicated hereon is advisory, considerable variation therefrom is left to the discretion of the commanding officer of the dispensary.											
3	Major.....			1	1		4	3													
4	Captain.....			1	1	1	4	4													
5	First lieutenant.....		1	1		1	4	4													
6	Total commissioned.....		2	3	2	2	3	12													
7	Technical sergeant, including.....		1					2	2												
8	First sergeant (585).....		(1)					(1)	(1)												
9	Pharmacist (149) b.....				(1)			(1)	(1)												
10	Staff sergeant, including.....				2			2													
11	Technician, medical (123).....				(1)			(1)													
12	Technician, surgical (225).....				(1)			(1)													
13	Sergeant, including.....				3			3	2												
14	Technician, dental (067).....				(1)			(1)	(1)												
15	Technician, medical (123).....				(1)			(1)	(1)												
16	Technician, surgical (225).....				(1)			(1)													
17	Corporal, including.....		1					1													
18	Stenographer (213).....		(1)					(1)													
19	Private, first class.....		6		15			7	6												
20	Private.....							14													
21	Chauffeur (245).....	5th	(1)					(1)													
22	Chauffeur (245).....	6th	(2)					(2)													
23	Clerk, general (055).....	4th	(1)					(1)													
24	Motorcyclist (678).....	6th	(1)					(1)													
25	Pharmacist (149).....	3d			(1)			(1)	(1)												
26	Pharmacist (149).....	4th			(1)			(1)													
27	Technician, dental (067).....	4th			(1)			(1)	(1)												
28	Technician, dental (067).....	5th			(1)			(1)													
29	Technician, dental (067).....	6th			(1)			(1)													
30	Technician, laboratory (051).....	4th			(1)			(1)	(1)												
31	Technician, medical (123).....	3d			(1)			(1)	(1)												
32	Technician, medical (123).....	5th			(3)			(2)													
33	Technician, surgical (225).....	3d			(1)			(1)	(1)												
34	Technician, surgical (225).....	5th			(1)			(1)													
35	Typist (247).....	6th	(1)					(1)	(1)												
36	Basic (521).....				(3)			(3)													
37	Total enlisted.....		8		21			29	10												
38	Aggregate.....		10		31			41	10												
39	Q Ambulance.....		1					1													
40	Q Car, light, 5-passenger sedan.....		2					2													
41	Q Motorcycle, with side car.....		1					1													
Summary of specialists' ratings																					
<table><tr><th>Class</th><th>Number</th></tr><tr><td>3d.....</td><td>3</td></tr><tr><td>4th.....</td><td>4</td></tr><tr><td>5th.....</td><td>6</td></tr><tr><td>6th.....</td><td>5</td></tr><tr><td>Total.....</td><td>18</td></tr></table>										Class	Number	3d.....	3	4th.....	4	5th.....	6	6th.....	5	Total.....	18
Class	Number																				
3d.....	3																				
4th.....	4																				
5th.....	6																				
6th.....	5																				
Total.....	18																				
The serial number symbol shown in parentheses is an inseparable part of the specialist designation. A number below 500 refers to an occupational specialist whose qualification analysis is found in section I, AR 615-26. A number above 500 refers to a military occupational specialist listed in section II, AR 615-26.																					

Plate 2. T/O 8-502. Organization of the General Dispensary, Communications Zone.

Dental section. This section cooperates with the personnel and supply sections and makes recommendations relative to the assignment of dental officers and to the procurement, storage, and issue of dental supplies. It compiles pertinent statistics from current dental reports and returns and recommends policies governing the extent and character of the dental service.

Veterinary section. A veterinary officer of appropriate grade, with a proper number of assistants, conducts this office. It deals with: veterinary hospitalization and evacuation, veterinary supply, veterinary sanitation including inspections of the condition of animals, veterinary statistics, veterinary administration, inspection of all foods of animal origin, inspection of forage, and veterinary public health administration of occupied territory.

Medical Establishments of the Communications Zone. The hospitals of the communications zone and hospital trains are discussed in the section, Hospitalization and Evacuation, below. Medical depots are discussed in the section on supply, below. A brief description of other medical installations of the communications zone is related in this section.

The general dispensary (T/O 8-502). These small units are organized for the purpose of providing medical and dental attendance for the commissioned, enlisted, and civilian personnel on duty at all large military headquarters within the theatre of operations. They are also established to provide general professional attendance in large communities having a floating military population. They may function directly under the communications zone commander or under local command.

	1	2	3	4	5													
	Unit	Specialist's ratings(class)	P and W	Enlisted cadre	Remarks													
1																		
2	Major		a 1		a Flight surgeon. b Flight surgeon or ophthalmologist-otolaryngologist. c May be flight surgeons. d Flight surgeon or neuro-psychiatrist.													
3	Captain		2 (• 1) (• 1)															
4	First lieutenant		• 3 (• 1)															
5	Total commissioned		6															
6	Staff sergeant		1	1	Summary of specialists' ratings:													
7	Sergeant		1															
8	Corporal		1															
9	Private, first class) including		4	1														
10	Private		7	1	<table><tr><th>Class</th><th>P and W</th></tr><tr><td>Third</td><td>1</td></tr><tr><td>Fourth</td><td>3</td></tr><tr><td>Fifth</td><td>3</td></tr><tr><td>Sixth</td><td>1</td></tr><tr><td>Total</td><td>8</td></tr></table>		Class	P and W	Third	1	Fourth	3	Fifth	3	Sixth	1	Total	8
Class	P and W																	
Third	1																	
Fourth	3																	
Fifth	3																	
Sixth	1																	
Total	8																	
11	Chauffeur (245)		(1)															
12	Clerk (55)	4th	(1)	(1)														
13	Clerk (55)	5th	(1)															
14	Clerk (55)	6th	(1)															
15	Motorcyclist (245)		(1)															
16	Technician, laboratory (51)	3d	(1)	(1)														
17	Typist (247)	4th	(2)															
18	Typist (247)	5th	(2)															
19	Basic		(1)															
20	Total enlisted		14	3														
21	Aggregate		20	3	The serial number symbol shown in parentheses for certain specialists is an inseparable part of the specialist designation. For qualification analysis, see corresponding serial number in section IV, MR 1-8 (old number 1-3).													
22	Q Car, light, 5-passenger sedan		1															
23	Q Motorcycle with side car		1															
24	Q Trucks, 1½-ton, cargo		2															

Plate 3. T/O 8-141. Organization of the Medical Examining Unit, Aviation.

Medical examining unit, aviation (T/O 8-141). These are usually authorized at the rate of one per army in the field. They are small units usually attached to the larger aviation centers where men are being trained or conditioned as fliers. Its principal function is to determine whether personnel is physically fitted for flying and for what particular type of flying an aviator is qualified or best suited.

Medical laboratories, general. A general medical laboratory would probably be established only in a large theatre of operations when the latter is at a distance from the zone

of the interior. Its functions include the standardization of technique and material for the laboratory service within the theatre of operations. Other activities are the production and standardization of diagnostic sera, standard chemical solutions, stains, biologicals, etc. Scientific investigation (research) is another special function; it is restricted to problems which offer in their solution a distinct contribution, directly or indirectly, toward the successful prosecution of military operations.

The medical laboratory, army or communications zone (T/O 8-234). (See Plate 5, Chapter IV.) The medical laboratory (army or communications zone) functions primarily as an epidemiological laboratory for the purpose of making such laboratory analyses, studies, and investigations as may be required in the control or prevention of disease. It may be utilized for diagnostic purposes where other laboratory facilities are lacking or inadequate. The communications zone laboratory usually operates under the immediate control of the communications zone surgeon, except when the communications zone is divided into sections. The communications zone laboratory may then be placed under the immediate control of a section surgeon.

Veterinary units. These comprise veterinary companies (separate) (T/O 8-99), veterinary evacuation hospitals (T/O 8-236), veterinary convalescent hospitals, veterinary general hospitals (T/O 8-509), and veterinary station hospitals.

The veterinary company (separate) is discussed under the "Army Veterinary Service" in Chapter IV because the army area is the usual area of operation for this unit.

The veterinary evacuation hospital (T/O 8-236) has a normal capacity of 150 animals with an emergency expansion to 300. (See Plate 4.) These hospitals have transportation sufficient for their own movement. They are established at points having similar advantages as the locations of evacuation hospitals for men, although they need not have direct rail-siding facilities. They receive animal casualties from the veterinary clearing stations of cavalry divisions and from veterinary aid stations of animal organizations not provided with veterinary troops. Evacuation of these casualties to the evacuation hospital from the division areas is accomplished by the veterinary company, separate. Evacuation hospitals carry on the functions generally similar to those performed by evacuation hospitals for men. They should be established within one day's march for animal casualties from the division veterinary aid stations or veterinary clearing stations. All cases requiring further evacuation are sent to the veterinary general hospitals of the communications zone by stock train or by evacuation columns of led animals. When the veterinary evacuation hospital is operating in the army area, the army veterinarian makes the arrangements for the evacuation of animal casualties from the evacuation hospital in much the same manner as is done for the evacuation of men.

The veterinary convalescent hospital has a normal capacity of 1000 animals. It furnishes a place for the reconditioning of worn-out or convalescent animals within the combat zone, thus avoiding the necessity of further evacuation for this purpose. It is usually located in the rear part of the army area and is not moved unless it is necessary to conform to major changes in the army area or the location of the veterinary evacuation hospitals. Army animals fit for duty are turned over to the army or corps remount depots.

The veterinary general hospital (T/O 8-509) has a normal capacity of 500 patients with facilities of expansion for 500 more. (See Plate 5.) They are located centrally with reference to the veterinary evacuation hospitals from which animals will be received; that is, on or immediately off the main arteries of railway traffic leading from the combat zone. They may also be located to serve the needs of base remount depots or near similar animal concentrations.

The veterinary station hospital has a normal capacity of 150 patients. They are designed to meet local needs and are established in division training or rest areas, along main lines of communication where there are sufficient animals to justify their maintenance, and where it would not be in the interest of economy to utilize a veterinary general hospital. They function under local commanders.

Section Surgeons. In order to secure centralized control and decentralized operation of supply and administration, the communications zone may be subdivided from front to

1	2	3	4	5	6	7	8
UNIT	Serial Number	Specialists Ratings (class)	Hdqs.	First (basic) Platoon ^a	Second (ward) Platoon ^b	Total	Enlisted Cadre
Lieutenant colonel -----			1			1	
Major -----				1		1	
Captain -----			1		2	3	
First lieutenant -----					1	1	
Total commissioned -----			2	1	3	6	
Technical sergeant -----			1			1	1
First sergeant -----	(585)		(1)			(1)	(1)
Staff sergeant, including -----			1	1	1	3	
Supply -----	(186)		(1)			(1)	
Platoon leader -----	(651)			(1)	(1)	(2)	
Sergeant, including -----			1	2	3	6	3
Mess -----	(124)		(1)			(1)	
Pharmacist, veterinary -----	(150)			(1)		(1)	(1)
Surgical technician, vet. -----	(250)			(1)		(1)	(1)
Wardmaster -----	(793)				(3)	(3)	(1)
Corporal, including -----			1		6	7	1
Company clerk -----	(065)		(1)			(1)	
Assistant wardmaster -----	(793)				(6)	(6)	(1)
Private, first class, and -----							
Private, including -----			14	25	33	72	7
Bugler -----	(021)		(1)			(1)	
Chauffeur -----	(245)	5th	(2)			(2)	
Chauffeur -----	(245)	6th	(2)			(2)	
Clerk -----	(055)	5th	(1)	(1)	(1)	(3)	
Clerk -----	(186)	6th	(1)			(1)	
Cook -----	(060)	3d	(1)			(1)	
Cook -----	(060)	4th	(1)			(1)	
Cook's helper -----	(521)		(1)			(1)	
Horseshoer, clinical -----	(094)	4th		(1)		(1)	(1)
Horseshoer -----	(094)	5th		(1)		(1)	(1)
Mechanic, general -----	(121)	5th	(1)			(1)	
Motorcyclist -----	(678)	6th	(1)			(1)	
Orderly -----	(696)		(1)		(1)	(2)	
Orderly, ambulance -----	(696)			(6)		(6)	
Orderly, stable -----	(697)			(2)	(12)	(14)	
Pharmacist, veterinary -----	(150)	4th				(2)	(1)
Saddler and harness maker -----	(192)	5th	(1)			(1)	(1)
Technician, surgical, vet. -----	(226)	3d		(1)		(1)	(1)
Technician, surgical, vet. -----	(226)	3d		(1)		(1)	(1)
Technician, surgical, vet. -----	(226)	5th		(3)	(1)	(4)	(1)
Technician, surgical, vet. -----	(226)	6th			(3)	(3)	(1)
Technician, veterinary -----	(250)	3d		(1)		(1)	(1)
Technician, veterinary -----	(250)	4th		(1)	(2)	(3)	(1)
Technician, veterinary -----	(250)	6th		(1)	(9)	(10)	(1)
Basic -----	(521)			(4)	(4)	(8)	
Total enlisted -----			18	28	43	89	16
Aggregate -----			20	29	46	95	10
Q-Car, 5-passenger, sedan -----			1			1	
Q-Motorcycle, with side car -----			1			1	
Q-Trailer, tank, water, 250-gal. -----			1			1	
Q-Trailer, 1-ton, cargo -----			1			1	
Q-Truck, 1½-ton, cargo -----			3			3	

(Tentative T/O, Oct 9, 1940, as used at Medical Field Service School.) This table supersedes T/O 288-W, February 23, 1927.

REMARKS

Summary of Specialists Ratings:

Class	No.
2d	1
3d	3
4th	7
5th	12
6th	17
Total	40

The serial number symbol shown in parenthesis is an inseparable part of the specialist designation. A number below 500 refers to an occupational specialist whose qualification analysis is found in Section I AR 615-26. A number above 500 refers to a Military occupational specialist, listed in the Index, Section II, AR 615-26.

Normally 3 hospitals per army, 1 per Army Corps, and 1 additional per each Cavalry Division.

^a May be divided into:

Receiving section.
Operating section.
Pharmacy section.
Forwarding and Evacuation section.

^b May be divided into:

Surgical section.
Medical section.
Contagious section.

	1	2	3	4	5	6	7	8
	UNIT	Specif. Serial Number	Spec. Ratings (class)	Headquarters	Operating & Clearing Section ^a	Ward Section ^b	Total	Enlisted Cadre
2	Lieutenant colonel -----			1			1	
3	Major -----				1		1	
4	Captain -----			1 ^m	1	2	4	
5	First lieutenant -----			1	1	3	5	
6	Total commissioned -----			3	3	5	11	
7	Master sergeant including -----			1			1	1
8	Sergeant major -----	(052)		(1)			(1)	(1)
9	Technical sergeant, including -----			1			1	1
10	First sergeant -----	(585)		(1)			(1)	
11	Staff sergeant, including -----			1	3	1	5	2
12	Receiving and issuing animals -----	(186)			(1)		(1)	(1)
13	Supply -----	(186)		(1)			(1)	
14	Technical sergeant, vet. -----	(250)			(1)		(1)	(1)
15	Ward section, chief -----	(793)			(1)	(1)	(2)	
16	Sergeant, including -----			3	5	3	11	3
17	Mess -----	(124)		(1)			(1)	
18	Technician, medical -----	(123)		(1) ^m			(1)	(1)
19	Forage inspector -----	(085)		(1)			(1)	(1)
20	Wardmaster -----	(793)			(2)	(3)	(6)	
21	Technician, surgical, vet. -----	(250)			(2)		(2)	(1)
22	Corporal, including -----			1	3	7	11	
23	Clerk -----	(052)		(1)			(1)	
24	Assistant wardmaster -----	(793)			(2)	(7)	(10)	
25	Private, first class, and -----						81	4
26	Private, including -----			42	81	119	161	9
27	Bugler -----	(021)		(1)			(1)	
28	Carpenter, general -----	(050)	5th	(2)			(2)	
29	Chauffeur -----	(245)	5th	(2)	(1)		(3)	
30	Chauffeur -----	(245)	6th	(4)			(4)	
31	Clerk, personnel -----	(055)	4th	(1)			(1)	
32	Clerk, general -----	(055)	6th	(1)			(1)	
33	Clerk -----	(186)	5th	(1)			(1)	
34	Cook -----	(060)	3d	(3)			(3)	(1)
35	Cook -----	(060)	4th	(3)			(3)	(1)
36	Cook's helper -----	(521)		(4)			(4)	
37	Horseshoer, clinical -----	(094)	3d		(3)		(3)	(1)
38	Horseshoer -----	(094)	4th		(3)		(3)	(1)
39	Horseshoer -----	(094)			(2)		(2)	
40	Meat and Dairy Hygienist -----	(120)	4th	(1)			(1)	
41	Mechanic, auto -----	(014)	3d	(1)			(1)	
42	Motorcyclist -----	(678)	5th	(1)			(1)	
43	Orderly -----	(695)		(1)	(1)	(2)	(4)	
44	Orderly, ambulance -----	(696)			(3)		(3)	
45	Orderly, stable -----	(697)			(12)	(76)	(88)	
46	Pharmacist, veterinary -----	(150)	3d		(2)		(2)	(1)
47	Pharmacist, veterinary -----	(150)	6th		(2)		(2)	
48	Saddler, leather worker -----	(192)	4th	(1)			(1)	
49	Stenographer -----	(913)	3d	(1)			(1)	
50	Teamster -----	(235)	5th			(1)	(1)	
51	Teamster -----	(235)	6th			(1)	(1)	
52	Technician, laboratory -----	(051)	4th		(2)		(2)	(1)
53	Technician, laboratory -----	(051)	6th		(2)		(2)	
54	Technician, sanitary -----	(196)	4th	(2)			(2)	(1)
55	Technician, medical -----	(123)	4th	(2) ^m			(2)	(1)
56	Technician, sanitary -----	(196)	6th	(2) ^m			(2)	
57	Technician, surgical -----	(225)	3d	(2) ^m			(2)	(1)
58	Technician, surgical, vet. -----	(226)	2d		(2)		(2)	(1)
59	Technician, surgical, vet. -----	(226)	3d		(2)	(1)	(3)	
60	Technician, surgical, vet. -----	(226)	4th		(3)	(1)	(4)	
61	Technician, surgical, vet. -----	(226)	5th		(4)	(2)	(6)	(1)
62	Technician, surgical, vet. -----	(226)	6th		(8)	(4)	(12)	
63	Technician, veterinary -----	(250)	3d		(2)	(1)	(3)	(1)
64	Technician, veterinary -----	(250)	4th		(5)	(4)	(9)	
65	Technician, veterinary -----	(250)	5th		(7)	(5)	(12)	(1)
66	Technician, veterinary -----	(250)	6th		(10)	(6)	(16)	
67	Typist -----	(247)	4th	(1)			(1)	
68	Basic -----	(521)		(5)	(5)	(15)	(25)	

Plate 5. T/O 8-509. Organization of the Veterinary General Hospital. (See opposite page).

60	Total enlisted	49	92	130	271	20
70	Aggregate	52	95	131	281	20
71	Q-Animals			8	8	
72	Mules, draft			(8)	(8)	
73	Q-Car, motor, 5-passenger	1			1	
74	Q-Motorcycle, with side car	1			1	
75	Q-Truck, 2½-ton, cargo	3			3	
76	Q-Truck, 2½-ton, cargo, with stock rack body		1		1	
77	Q-Truck, 1½-ton, cargo	2			2	
78	Q-Wagon, escort			2	2	

(Tentative T/O, Oct. 17, 1940, as used at Medical Field Service School.) This table supersedes T/O 686-W, April 2, 1926.

REMARKS

^a May be divided into operating, receiving, evacuating pharmacy sections.

^b May be divided into surgical, medical and contagious wards.

^m Medical Corps.

Summary of Specialists Ratings:

Class	No.
2d	2
3d	18
4th	29
5th	26
6th	40
Total	113

Plate 5. T/O 8-509. Organization of the Veterinary General Hospital (Continued).

rear into three parts: an *advance section*, an *intermediate section*, and a *base section*. The communications zone will not be organized in the same manner in each theatre of operations. Its organization must be adapted to the plan of operations and be based on a careful study of the actual conditions in the theatre of operations. When the depth of the zone is considerable, there is normally an advance section. If the communications zone is very extensive, an intermediate section may be established between the base and advance sections. The extent of this subdivision is determined by the location of centers of commerce and population, the location and direction of the principal lines of communications, and the number of activities and total personnel that can be supervised by one staff. Section surgeons are assigned accordingly.

The office of the surgeon of a section. The office of the surgeon of a base or other section is organized in a manner similar to that of the office of the surgeon of the communications zone, although on a smaller scale. The surgeon must so organize his office as to be free to circulate among the various and dispersed activities within the section as he exercises supervisory control over various Medical Department activities which are under the control of the commanding general of the section. The functions of the latter are principally those of an area commander; he exercises no authority over general supply establishments. Medical activities usually include *station hospitals*, *general dispensaries*, *medical laboratories*, *veterinary establishments*, and *sanitation of the area*.

The Surgeon Embarkation-Debarkation Camp. The surgeon of an embarkation-debarkation camp bears the same relationship to the commanding officer of the camp as the surgeon to the commanding officer of a garrison. He has additional responsibilities imposed by the arrival and departure of troops and casualties. Embarkation and debarkation camps for large expeditionary forces will usually consist of one or more large concentration camps or centers conveniently located to base ports. The office of the surgeon of such a camp is organized as related below. The organization herein does not contemplate that the surgeon be also surgeon of the port proper. If such is the case, additional sections of the office are necessary.

Administration section. This section coordinates the duties of the office and receives, records, and distributes mail.

Hospitalization section. This section has general supervision over the care and hospitalization of all sick and wounded passing through the camp, both to and from the zone of the interior. Hospitalization and care of sick and wounded may be extensive, especially if large numbers of troops and casualties are moving.

Receiving and forwarding section. This section receives the sick and wounded for return to the zone of the interior and inspects troops received from or returning to that zone. The section may be subdivided as follows:

The *receiving subsection* arranges for the examination of troops or sick passing through the port and disposes of those found disabled. The latter are usually sent to the hospitals of the camp.

The *forwarding subsection* arranges for the transportation of the disabled to the zone of the interior.

The *physical examination subsection* conducts the physical examination of troops. By examining those received from the zone of the interior, diseases that may be a menace to the field forces may be detected. Homeward-bound troops are also examined to detect diseases that may be a menace to the homeland. Examining teams also conduct the medical supervision of bathing and delousing establishments through which all homeward-bound troops, and on occasions those arriving from the zone of the interior, must pass.

Teams are designated to meet every train filled with sick and wounded to be embarked, to examine all cases that give evidence of lack of condition for further travel, and to render any medical assistance in case of sudden sickness or injury among troops arriving or departing. The personnel of these teams is also assigned to accompany troop trains for the purpose of medical attendance.

Liaison (with overseas transport) subsection keeps the office informed as to the arrival and departure of vessels pertaining to the expeditionary force. These may be operated by the navy, army transport service, or other agency.

Sanitation section. The functions of the sanitation section consist, generally, of supervising the sanitation of the camp and the execution of measures for the control of communicable diseases. The nature and functions of these embarkation-debarkation camps are such that special attention must be devoted to the prevention of epidemics, particularly of respiratory diseases. Because of these conditions, the sanitation section is especially concerned with the supervision of the physical inspections of troops and the sanitation of housing facilities.

Supply section. The supply section supervises the medical supply activities of the camp.

The Surgeon, Army Group. Two or more armies may be organized into a group of armies under a designated commander. The surgeon of an army group is the advisor of the group commander upon medical matters relating to the group. He is a coordinator of medical activities between the armies and general headquarters. He forwards important communications upon medical subjects from the surgeons of the armies to the chief surgeon of the forces, but beyond this does not conduct an office of transmittal. He maintains no office of record, beyond keeping a file of communications of immediate interest.

The Surgeon, Army. The surgeon's office, or headquarters army medical service, is organized into sections concerned with the control of the activities of the medical service within the army. These sections are: *administrative, hospitalization, supply, evacuation, sanitation, consultant, dental, and veterinary.* (See Chapter IV.)

The Surgeon, Corps. As the administrative functions of corps headquarters are limited, the surgeon's office has only four sections, *administrative, consultant, dental, and veterinary.* (See Chapter IV.)

The Division Surgeon. From a tactical and administrative viewpoint, the infantry division is the basic organization of an army. It comprises in its organization the essential combat and administrative branches, all in correct proportion and so organized as to make it tactically and administratively a self-sustained unit. The division is the combat and tactical maneuvering unit of the combined arms. Its role in battle is the execution of tactical missions vital to the combat success of the corps.

See Chapter III for the organization of the division surgeon's office.

STAFF RELATIONSHIP *

The Chief Surgeon's Relation to the Commander and His General Staff. The chief surgeon of a field force is a member of the special staff of the commander of the field force. As such, he is the technical advisor to the commander and his general staff in all matters pertaining to his specialty, keeping them informed of the status, capabilities, limitations, and general efficiency of medical troops and units. In his capacity as head of the technical, supply, and administrative service, he is responsible for the functioning and the efficient operation of the Medical Department throughout the theatre of operations. He submits recommendations on matters of policy affecting the medical service and prepares such portions of projects or plans as pertain thereto.

In order that the Medical Department may accomplish the mission for which it is created, to serve the needs of the combat forces, its plans and operations must always be based upon the fullest knowledge of the plans of the commander. This information should always be given to the chief surgeon in ample time to permit him to develop his own plans and submit them to the general staff section involved. The medical plan is a part of and has a direct bearing on the operation of any major activity, either of combat or of the supply system.

In order that the above relations may be assured, provision is made for designated medical officers of the chief surgeon's office to maintain close liaison with each section of the general staff. These officers will transmit necessary information to the chief surgeon and act as technical advisors to their particular general staff section on all matters pertaining to the Medical Department.

In this connection it must be borne in mind that the functions of the chief surgeon have not been altered in any manner by the introduction of a group of medical officers for liaison with the general staff. They have not been placed there to take over the duties formerly performed by the chief surgeon but are there to coordinate the policies and plans of the chief surgeon with the general plan. The general staff is not the operations agency for the medical service, nor must the medical officers in liaison with the staff of G-4 be looked upon as the operating agency of the Medical Department. The medical service from the nature of its duties comes within the domain of all general staff sections. Whereas it is true that G-4 has more to do with the medical service than the other general staff sections, the impression must not prevail that the medical service is a supply service alone, nor must we consider evacuation as an administrative procedure. Once the plans and policies of the chief surgeon have been approved by the commander, the matter of preparing and coordinating the details of these plans with the general staff sections is a proper role of the medical group in liaison with the general staff sections. In practice the chief surgeon of a force has always conferred directly with surgeons of lower units and the chiefs of other services, and always must do so—as to the details of approved and promulgated plans and projects, as to the daily routine, and as to matters of a purely technical nature within the service. Commanders of all grades will undoubtedly uphold such a policy as long as they or their general staff are kept fully informed of all essential details and can influence action if they so desire. The proper means of informing the staff is through the liaison officers of the chief surgeon with the general staff sections. The principle to be laid down is that in technical details or in details affecting the routine of the medical service or as regards the details of an approved and promulgated plan or project, the surgeons of the various sections of the theatre of operations confer directly, the chief of the higher units supervising and coordinating the work of the lower units as regards the above details. Each subordinate surgeon of course must keep the general staff of his unit informed of any essential detail of which it should be cognizant. This is known as "direct supervision." But where new policies or new projects requiring general coordination are concerned, the surgeon of the higher unit recommends to the general staff of his unit the action to be taken, the same if approved to be promulgated in orders to the command through the regular channels of command responsibility. This is "indirect supervision."

*See Chapter VI, Part I, "Command and Staff Procedure."

The chief surgeon at general headquarters is concerned with broad policies rather than the detailed operations involved; therefore, the supervision exercised by him over the affairs of the medical service is most often of the indirect kind, namely, by recommendation to the commander in chief.

The Chief Surgeon's Relation to Subordinate Commanders. The chief surgeon should keep informed of all the activities of the communications zone and of the armies that might in any way affect his services. This is done by information received through the staff of his own headquarters or from contact with their representative with subordinate commands. The chief surgeon at general headquarters can influence the actions of a commander subordinate thereto in affairs that concern the Medical Department in two ways—by recommendation to the proper general staff section which, if it approves, will issue the necessary instructions to the subordinate commander; or by advising his representative on the staff of the subordinate commander as to the recommendations or actions he should take. For example, the commander of the communications zone might direct the Engineers to concentrate their construction activities on the erection of barracks and storehouses. At the same time the chief surgeon at GHQ believes that construction of hospitals is of vital importance. He may affect a change, either by recommending to G-4, GHQ, that the commanding general, communications zone, be directed to give the hospital project proper priority or by informing the surgeon, communications zone, of the situation and advising him to urge the change on his own commander. The method adopted will usually depend upon the personality of the officers involved.

The Chief Surgeon's Relationship to All Medical Department Activities. Within his own branch, the chief surgeon makes frequent technical inspections of Medical Department activities, keeps in close touch with his subordinate chiefs in the combat and communication zone, sees that the necessary coordination exists in departmental matters between the communications and combat zones, and keeps in touch on technical matters with The Surgeon General in the War Department. Direct correspondence on technical matters is authorized between these officers.

He is responsible for the policies governing the procurement, storage, and issue of supplies furnished by the Medical Department in accordance with the instructions, policies, or plans of the commander. The operation of these policies is placed in the hands of the surgeon, communications zone.

He is responsible for the establishment, maintenance, and efficient operation of Medical Department agencies such as medical sections of depots, hospitals, laboratories, etc. As he has merely technical supervision* over these establishments in the communications zone, control and operation being vested in local commanding officers, the responsibility is accomplished by making inspections and suitable recommendations and by technical supervision.

He is responsible for furnishing, training, and recommending the utilization of the personnel of the Medical Department throughout the theatre of operations.

Relations with Other Technical, Supply, and Administrative Services. The chief surgeon and the chiefs of each of the technical, supply, and administrative branches on the staff of the commander of the theatre of operations, the communications zone, or any section of the latter, must of necessity work together as many of the activities of each are dependent upon or related to that of the others. To this end, each chief, in preparations of plans and projects, will confer with others on matters which pertain to them. If unable to coordinate their plans satisfactorily, the difference must be settled by the general staff section involved, as representing the commanding general. In general, the relations are carried on by personal conference of representatives of each branch, acting for their chiefs. At times when relations are particularly close, it may be desirable to detail a representative of the Medical Department with other branches, such as the Chemical War-

*An illustration of this technical control is shown by a consideration of standardized building material requirements for hospitals. The actual construction is decentralized and is carried out by engineer officers locally. Hence, general headquarters standardizes design; communications zone headquarters works out the details for procurement; and sections of other local headquarters build according to general headquarters design and communications zone procurement. Another illustration is the direction or standardization of professional treatment of patients.

fare Service, the Corps of Engineers, etc. Some of the more common points of interrelation of branches are detailed below.

The Quartermaster Corps furnishes a large part of the supplies used by all other branches. The latter will be constantly interested in their availability and suitability. As this branch controls the bulk of storage, it will have the greatest influence in the location of general depots. The Medical Department, however, also has an interest in the same thing and should be consulted. The Quartermaster functions of transportation, salvage, and labor supply are at times of vital importance to the Medical Department. The two services have co-related functions as to baths, laundries, and disinfectors; sanitation; and the suitability of clothing and rations.

The Medical Department is involved in activities of other branches that affect health and sanitation. It has functions with the Engineers in regard to hospital construction and the supply and purification of water.

With the Chemical Warfare Service, it must study gas defense and the treatment of gas casualties as well as the toxic effect of gas on the enemy.

Relationship of the Surgeon, Communications Zone, to the Commander, Communications Zone, and His Staff. The surgeon on the staff of the commander of the communications zone bears the same relationship to the commander of the communications zone as the chief surgeon of the field force bears to the commander of the field force. The commanding general of the communications zone has functions pertaining to the entire theatre of operations, also those pertaining to the communications zone as a territorial command. The surgeon, communications zone, has functions in connection with both. Therefore, it is necessary for the medical officers in liaison with the general staff and the chief surgeon at general headquarters to keep the surgeon and his staff in the communications zone fully informed of the detailed changes in the operation of established plans.

Functions in theatre of operations. The communications zone surgeon's functions as to the theatre of operations as a whole pertain to *personnel, supply, hospitalization, and evacuation.*

Under the general policies as to the requirements of the theatre and as to priorities as determined by general headquarters, he is fundamentally charged with the preparation of all detailed supply requirements of the Medical Department and the call therefor from the zone of the interior.

Under the general instructions as to storage and issue and the allotment of storage space in the theatre, as determined by general headquarters, he is responsible for the proper distribution of supplies at the level set, the distribution required to cover the credits allowed by general headquarters to the armies of the theatre of operations, and the establishment of sections of depots and facilities to handle these supplies; also the training and distribution of personnel to efficiently operate the supply system.

He is responsible for all details in connection with the distribution of Medical Department personnel within the communications zone and with the allocation of units and individuals to the combat zone and Medical Department concentration centers, in compliance with policies and priorities as established by GHQ. This responsibility further includes all details of administration connected with appointment, promotion, transfer, and separation from the service of Medical Department personnel.

The surgeon will be chiefly concerned with the coordination of hospitalization and evacuation activities in accordance with the policies outlined by the chief surgeon of the field force.

Functions in communications zone. As the communications zone is a territorial command, the commander is charged with its administration as such. The communications zone surgeon, in addition to his functions as adviser to the commander, is the representative of the Medical Department. He, therefore, under the direction of the commander, controls the operations and activities of the establishments pertaining to the Medical Department that are not under local commanders.

If the communications zone is divided into sections, as in a deep zone, these functions are also those of the *section surgeon* on the staff of the section commander. In case an

establishment located in the section is not directly under section control, as for example, a general depot, the section surgeon may influence operation by recommendation to his commander, giving only strictly technical advice to medical representatives.

Relationship of Medical Staff Officers with General Staff Sections. This paragraph relates primarily to those medical officers, on the staff of the chief surgeon, who function as liaison officers with the several sections of the general staff at general headquarters. The matters discussed, however, apply generally to the assistants of the surgeon, communications zone, assistants to a section surgeon or an army surgeon in their relationship with the general staff sections at their respective headquarters. Medical officers functioning as liaison officers with general staff sections must not be regarded as independent agencies, that is to say, each a separate cogwheel turning a distinct and separate part of the medical service machine. They must not only work with the general staff but must work together for the common good of the force and of the medical service. They should, in fact as well as in principle, be the representatives of the surgeon in whose office they are on duty.

Liaison with G-1. This general staff section is concerned with coordinating matters relating to plans, policies, priorities, and decisions pertaining to the personnel of the command as individuals. A liaison officer, therefore, represents the chief surgeon on personnel matters for the Medical Department, such as replacement, classification, assignment, transfer, promotion, elimination, and discharge.

As G-1 has general supervision over sanitation and sanitary inspection, the medical representative must furnish G-1 with such technical advice and assistance along these lines as may be required and must see that the approved policies of the chief surgeon in all matters relating to sanitation are properly coordinated.

G-1 also has general supervision over all welfare societies. As the Red Cross becomes a part of the medical service during War, the medical representative must make such recommendations as to its use (exclusive of Red Cross hospitalization, a G-4 function) that are in accord with the general plans and the plan of the chief surgeon.

Such other matters as statistical reports, awards of decorations, sanitary regulations of occupied territory, the treatment of sick and injured prisoners of war, general regulations and executive administration as affect the Medical Department, medical contribution to moral work, medical recommendations as to the health of quartering and billeting areas, and medical control over leave areas, are matters coordinated by G-1.

Liaison with G-2. G-2 is concerned with securing information of the enemy.

The officer in liaison with G-2 obtains early information as to the character of resistance that may be expected from the enemy, the type of armament or the introduction of new methods of warfare that will affect the number or type of casualties to be expected, the use and type of gasses and their character, the roads and railroad and evacuation system in the enemy's territory that will be of future value to the medical service if an advance into this territory is made, the character of public buildings in enemy villages and other facilities that may be made of use in future hospitalization projects, the type of prevailing diseases among the enemy's troops and in the territory to be taken over. He should also assure himself that the office of the surgeon is amply supplied with such situation, tactical, and strategical maps as may be needed in the studies necessary for the formulation of plans.

G-2 may be assisted by giving him such technical advice and assistance as will enable him to evaluate the information of the health conditions of the enemy troops and the territory occupied by the enemy—the effect of climatic conditions on the health of our own troops, the pathological effect on our troops of special types of gasses employed by the enemy, etc. A liaison officer may also assist G-2 by preparing such plans as will assure that all information that can be obtained from wounded prisoners in medical formations will be made available to him. He should furnish such technical information that will be of value to press representatives regarding the health of our own forces and supply such data regarding the same as may be of value for the purpose of propaganda. He may also furnish such information to G-2 as will be of value in proving the incorrectness of enemy propaganda in regard to care given their sick and wounded prisoners, the effectiveness of

new weapons employed by them against our forces, and the casualties suffered by us as a consequence.

Liaison with G-3. A medical officer in liaison with G-3 will be charged primarily with keeping the chief surgeon in touch with the development of the combat situation; with informing him of any change in the situation that affects the Medical Department plans; with acting as the chief surgeon's representative in matters affecting the Medical Department, both from a standpoint of composition of forces and their organization, operation, and training. He will be concerned with troop movements; location of camps, billets, and training sites; and the relief of troops as they affect Medical Department activities.

One of his chief duties will be to assist in supervision and coordination of the training policies of the Medical Department. He prepares the medical section of training directives. He may assist in the inspection of medical training centers and the inspection of medical units attached to tactical commands.

He makes recommendations to G-3 for needed changes in the Medical Department organization and equipment.

He is especially charged with the priority schedule for medical troops coming into the theatre of operations and for making representations to G-3 in order that a proper balance of medical troops will always be included in troop shipments. He is charged with recommending the priorities for the assignment of medical replacements received.

Liaison with G-4. As the G-4 section is charged with the supervision and coordination of the functions of evacuation, hospitalization, and supply, the Medical Department will have the major part of its dealings with this section.

The medical liaison group is concerned with preparing the plans of the chief surgeon and coordinating them with those of the commander in all matters affecting medical supplies, such as tonnage, procurement, storage, and distribution; the locations, extent, and character of all hospital construction projects; activities involving the operation of evacuation such as the assignment of transportation, the use of roads, waterways and railroads, rail heads, regulating stations, and the assignment of hospital trains. In cooperation with the medical officers in liaison with G-3, recommendations are made as to the assignment and movement of all Medical Department units. (The actual movement orders are issued by the G-3 section).

This group in conjunction with the other Medical Department staff liaison officers prepares that portion of the G-4 plan concerning the activities of the Medical Department such as *supply*, *evacuation*, and *hospitalization*. These plans are of course drawn up at the direction of the chief surgeon and in accordance with the approved plans and policies announced by him.

As the regulating officer comes under control of the G-4 section, GHQ, so also does the medical regulator come under the control of the medical group in liaison with G-4, GHQ.

Relationship of Army, Corps, and Division Surgeons to Their Commanders. The surgeons of these units belong to the special staff groups at headquarters of the army, corps, or division. They act in an advisory capacity as staff officers and also command the medical personnel and units pertaining to the army, corps, or division. The division surgeon, however, has a somewhat different status as he exercises command of the division medical regiment and issues orders to it as such, whereas corps and army surgeons control medical units of the corps or army medical service by recommendations to the proper general staff section. For example, if the army surgeon desires to move an evacuation hospital, the surgeon prepares a recommendation, giving the desired wording of the order, obtains the approval of G-4, and submits it to G-3, whereupon the latter issues the order for movement. Orders for the transfer of individuals, supply arrangements, and other administrative details for the medical service within the army are issued by the army surgeon in accordance with announced policies.

HOSPITALIZATION AND EVACUATION

Definitions. *Military hospitalization* may be defined as the process of providing shelter, care and other environmental factors needed to restore the disabled to health and physical fitness.

Evacuation of the sick and wounded may be defined as the withdrawal of casualties to a place where proper care and treatment may be given.

Hospitalization and evacuation of the sick and wounded are co-related subjects. When either is discussed, the other must be considered. It may be said that military hospitalization is but a phase of evacuation. It may be said in turn that evacuation is a phase of hospitalization. The evacuation of advanced units is influenced by hospitalization facilities in the rear. As the distance from the front increases, the necessity for evacuation decreases and hospitalization becomes more fixed. See Plate 1.

Hospitalization, in a broad sense, refers particularly to fixed as distinguished from mobile hospitalization. It embodies not only shelter from the elements but all other appurtenances in the way of bedding, food, clothing, heat, light, nursing, treatment by surgical and medical specialists, X-ray and laboratory facilities, and opportunity for convalescence and recreation. Hospital "beds" is a numerical term referring to hospital capacity.

Hospital Allowances. Hospital allowances for a theatre of operations are expressed in terms of total "*fixed beds*" to be provided and not in terms of units. Only those beds established in fixed hospital units designed to give definite treatment are considered. The total number of beds provided for a theatre of operations may not necessarily be located within the theatre. If the theatre of operations adjoins the zone of the interior, with only a shallow communications zone, the majority of fixed beds for the casualties of the theatre may lie within the zone of the interior. The farther the theatre of operations is removed from the zone of the interior, the greater the proportion of beds that must be authorized for establishment within the communications zone. The number of beds to be thus established also depends on many other factors, among them being the nature and extent of combat, the shelter and other facilities within the theatre, the resistance of the enemy, and conditions which may influence health among troops. In determining the policy of evacuation and the number of beds to be provided, these variables should be analyzed. It is important that the allowances be fixed in each specific war plan in order to assure an equal and balanced flow of units to the theatre of operations sufficient to meet hospitalization requirements at all times. Such allowances are generally fixed on a sliding scale, i.e., the percentage of beds increases as a war develops or becomes prolonged. During the period of mobilization, before combat begins, beds are necessary for the sick only. When combat begins, additional beds must be available for the wounded. As many of the wounded require prolonged treatment, they accumulate in hospitals, making necessary a still larger proportion of beds. The percentage of beds required gradually increases in proportion to the severity and intensity of combat. Since many cases requiring long treatment eventually recover, the percentage of beds required gradually becomes more constant.

Average bed allowance. It should be realized that each condition cited represents a different situation. The number of treatment beds to be provided for a given theatre and the time they should be available will vary. The policy of evacuation must be decided; on this depends the proportion of treatment beds that are to be provided in the theatre of operations. The most constant factor will usually be the number of beds that must be provided for the casual sick, that is, 5 beds for every 100 men.

Sick rates. Excluding the influenza epidemic during September and October, 1918, the daily admission to hospital for non-battle casualties during the World War was 1.40 per thousand. It should be remembered that this rate was for seasoned troops in a healthful area. The average stay in hospital for the casual sick was 27.29 days. One and one-half per cent died and 9 per cent were sent to the zone of the interior. As the cases invalided home included many returned after the armistice, of which only 2 per cent were discharged as unfit, 3 per cent should be considered as the proportion that would normally be invalided home. Taking these factors into consideration and allowing a slight increase of the admittance rate (1.4 per M to 1.5 per M) to cover normal seasonal and other variations above the average, treatment beds for sick alone under such conditions may be estimated as follows:

Daily admittance rate per M		Average days in hospital		Beds required per M
1.5	X	27.29	=	40.9 or 4.09 per cent

Additional beds should be allowed for dispersion of patients, making this figure approximately 5 per cent.

Battle casualties. During the period July 1 to November 11, 1918, both *sick* and *wounded* were evacuated to treatment beds at the rate of 2.65 per day per thousand of the entire A.E.F. This period covered the real combat activities of the American Expeditionary Forces. Fighting may be said to have been continuous, but it differed in intensity from day to day. The number of divisions engaged on any one date also varied considerably.

Battle wounds require longer treatment than sick casualties. The average stay in hospital of the sick and wounded increased with the proportion of the latter. The average duration of treatment was 48.6 days. The average treatment beds required at the end of a year for a force of constant size under such conditions may be estimated as follows:

$$2.65 \times 48.6 = 128.8 \text{ per M. or } 12.88 \text{ per cent.}$$

Additional beds should be allowed for dispersion of patients, increasing this figure to 14 per cent.

With such battle losses as occurred during the severe combat of the Meuse-Argonne offensive (September 26 to November 11, 1918), the daily admittance rate to treatment beds for both sick and wounded was increased to 3.2 per thousand of the total strength of the A.E.F. Under such conditions, the ultimate number of beds required may be estimated as follows:

<i>Kind of cases</i>	<i>Daily rate of admission</i>		<i>Average days per case</i>		<i>Ultimate No. in hospital</i>
Disease and non-battle injuries ..	1.65	X	27.29	=	45.03
Gas injuries .....	.45	X	41.77	=	18.79
Gunshot injuries	1.10	X	94.84	=	104.32
Total per 1000 strength					168.14

The rate of 168.14 per thousand will be the actual number of patients in hospital. If 10 per cent is added for the dispersion of patients the number of beds required would be 184.96 per thousand strength or 18.50 per cent of the total strength.

It should be noted that this rate of hospitalization was not attained by our forces in the World War. At the time of the armistice, approximately 10 per cent of the forces was in hospitals. However, if the battle losses had continued for a year at the rate experienced during the Meuse-Argonne, 18 per cent of beds would have been necessary. It is unlikely that combat of such gigantic proportions and severity would extend over a year; the requirement of 18 per cent of beds should therefore be considered as approaching the maximum.

Of all casualties inflicted by gunshot and gas, excluding the killed:

65 percent returned to duty in the theatre of operations within 90 days. (33 per cent recovered within 30 days; and 32 per cent recovered within the following 60 days).

6 per cent died in hospitals.

9 per cent were evacuated to the U. S.

20 per cent remained in hospitals in France after 90 days.

Of all battle casualties, excluding the killed, 21 per cent were a permanent loss as a military asset.

In smaller forces and over shorter periods of time, there will be a wider variation in the averages rates as given above.

Buildings for Hospitalization (Hospital Program). Some of the units destined to establish fixed hospitalization in the communications zone will usually be able to utilize existing shelter in permanent buildings. Accommodations for the remaining units must be provided by new construction. It may be accepted as based on experience that authorized construction will not become available for occupancy before the lapse of six months following authorization. Therefore, new construction for hospitals must be inaugurated in advance of the arrival of the troops for which intended. The Medical Department, if it is to keep its hospitalization program abreast of the needs, must be given authority to provide in advance, by construction or otherwise, the hospitals necessary to cover this delay in construction and to meet expected requirements. The program must anticipate the expected demand and by timely action insure that it is met. The chief surgeon of the

field force keeps in his office a balance sheet of the hospitalization program showing, in one column, the total bed requirements estimated, and, in the other column, the number of beds actually established, plus the number of beds in process of establishment in suitable buildings or to be provided by new construction.

Hospitals in the Theatre of Operations. Medical units provided in the theatre of operations for the hospitalization of armies in the theatre comprise mobile and fixed hospitals.

Mobile hospitals. Mobile hospitals accompanying the armies in the combat zone are equipped with sufficient tentage for sheltering patients; but, as a rule, advantage is taken of any opportunity to occupy and utilize existing buildings. These units comprise *clearing platoons, hospital companies or troops, surgical hospitals, evacuation hospitals,* and

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	Unit	Specialists' ratings (class)	Administrative service						Professional service						Total
			Headquarters	Registrar, receiving office and detachment of patients	Detachment, medical department	Medical supply	Mess	General supply and utility	Medical	Surgical	Dental	Laboratory	Roentgenological	Other services ^a	
2	Colonel.....		1												1
3	Lieutenant colonel.....		b 1						1	1					3
4	Major.....		a 1	2	a 1			a 1	7	6	d 1				22
5	Captain.....		(c 1) 2		i 1	i 1			9	10	d 3	1	i 1		28
6	First lieutenant.....		a 1	i 1					4	4	d 3	1	1		16
7	Second lieutenant.....		i 1			i 1	i 1	a 1							4
8	Total commissioned.....		7	3	2	2	2	2	a 21	a 21	a 7	3	3		73
9	Nurse.....		k 6						114						120
10	Master sergeant, including.....				3										3
11	Chief clerk (52).....				(3)										(3)
12	Technical sergeant, including.....				3						5				8
13	First sergeant.....				(1)										(1)
14	Chief clerk (52).....				(2)										(2)
15	Laboratory technician ¹										(1)				(1)
16	Male nurse ¹										(3)				(3)
17	Pharmacist ¹										(1)				(1)
18	Staff sergeant, including.....				13						7				20
19	Chemical laboratory technician ¹										(1)				(1)
20	Chief clerk (52).....				(3)										(3)
21	Clerk, general (55).....				(4)										(4)
22	Dental mechanic ¹										(2)				(2)
23	Mess (124).....				(1)										(1)
24	Section leader.....				(3)										(3)
25	Supply (186).....				(2)										(2)
26	Technician, medical (123).....										(2)				(2)
27	Technician, surgical (225).....										(1)				(1)
28	X-ray technician ¹										(1)				(1)
29	Sergeant, including.....				19						14				33
30	Basic.....				(3)						(3)				(6)
31	Chief clerk (52).....				(3)						(6)				(9)
32	Clerk, general (55).....				(5)										(5)
33	Meat and dairy hygienist ¹				(1)										(1)
34	Mess (124).....				(3)										(3)
35	Orthopedic mechanic ¹										(1)				(1)
36	Pharmacist (149).....										(1)				(1)
37	Supply (186).....				(2)										(2)
38	Technician, medical (123).....										(2)				(2)
39	Technician, sanitary (196).....				(1)										(1)
40	Technician, surgical (225).....										(1)				(1)
41	Transportation (14).....				(1)										(1)
42	Corporal, including.....				12						5				17
43	Basic.....				(12)						(5)				(17)
44	Private, first class.....				96						44				140
45	Private.....				191						88				279
46	Automobile mechanic (14).....	4th			(2)										(2)
47	Baker (17).....	4th			(1)										(1)
48	Baker (17).....	5th			(1)										(1)
49	Barber (22).....	3d			(1)										(1)

Plate 6. T/O 8-507. Organization of the General Hospital, Communications Zone.
(See opposite page.)

convalescent hospitals. The beds provided by them are not generally included in the term "bed" or "hospitalization allowances" for a theatre of operations. Only in specific instances, where they are to be converted to use as fixed hospitals, are they so classed.

Fixed hospitals. Fixed hospitals are the installations in the communications zone to which the sick and wounded are sent for definitive treatment. They comprise *general hospitals, station hospitals, hospital centers, and convalescent camps.*

Hospital Units of the Communications Zone. *General hospitals* (T/O 8-507). (See Plate 6.) The personnel of the general hospital unit is divided into two general

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Unit	Specialists' ratings (class)	Administrative service						Professional service						Total
		Headquarters	Registrar, receiving office and detachment of patients	Detachment, medical department	Medical supply	Mess	General supply and utility	Medical	Surgical	Dental	Laboratory	Roentgenological	Other services *	
50 Barber (22)	5th			(3)										(3)
51 Barber (22)	6th			(3)										(3)
52 Bugler				(3)										(3)
53 Butcher (37)	4th			(1)										(1)
54 Butcher (37)	6th			(1)										(1)
55 Carpenter (50)	4th			(2)										(2)
56 Chauffeur (245)	5th			(5)										(5)
57 Chauffeur (245)	6th			(10)										(10)
58 Chauffeur (245)				(5)										(5)
59 Clerk, general (55)	5th			(6)										(6)
60 Clerk, general (55)	6th			(9)										(9)
61 Clerk, mail (56)	2d			(1)										(1)
62 Clerk, mail (56)	5th			(1)										(1)
63 Clerk, mail (56)	6th			(2)										(2)
64 Clerk, stock (136)	5th			(4)										(4)
65 Cook (60)	2d			(3)										(3)
66 Cook (60)	4th			(12)										(12)
67 Cook (60)	5th			(21)										(21)
68 Mechanic, general (121)	5th			(4)										(4)
69 Motorcyclist				(2)										(2)
70 Operator, electric plant (77)	4th			(1)										(1)
71 Painter (144)	5th			(2)										(2)
72 Plumber (162)	4th			(2)										(2)
73 Stenographer (213)	3d			(5)										(5)
74 Tailor (234)	5th			(1)										(1)
75 Technician, dental, X-ray (264)	3d									(1)				(1)
76 Technician, dental (67)	5th									(7)				(7)
77 Technician, laboratory (51)	2d									(2)				(2)
78 Technician, laboratory (51)	4th									(4)				(4)
79 Technician, laboratory (51)	6th									(6)				(6)
80 Technician, medical (123)	2d									(1)				(1)
81 Technician, medical (123)	4th									(9)				(9)
82 Technician, medical (123)	6th									(40)				(40)
83 Technician, pharmacist (149)	4th									(2)				(2)
84 Technician, pharmacist (149)	6th									(2)				(2)
85 Technician, sanitary (106)	4th			(3)										(3)
86 Technician, surgical (225)	1st									(1)				(1)
87 Technician, surgical (225)	2d									(3)				(3)
88 Technician, surgical (225)	3d									(4)				(4)
89 Technician, surgical (225)	4th									(10)				(10)
90 Technician, surgical (225)	6th									(26)				(26)
91 Technician, X-ray (264)	3d									(4)				(4)
92 Technician, X-ray (264)	6th									(4)				(4)
93 Typist (247)	6th			(6)						(6)				(12)
94 Basic				(164)										(164)
95 Total enlisted				337						163				500
96 Aggregate				361						332				693
97 Q Ambulance, motor				8										m 8
98 Q Car, light, 6-passenger, sedan				2										m 2
99 Q Motorcycle, with side car				2										m 2
100 Q Truck, 1½-ton, 4 x 4, reconnaissance				2										m 2
101 Q Truck, 1½-ton, 4 x 4, cargo				4										m 4
102 Q Truck, 1½-ton, 4 x 4, dump				1										m 1
103 Q 2½-ton, 6 x 6 cargo				3										m 3

Plate 6. T/O 8-507. Organization of the General Hospital, Communications Zone.
(See next page.)

groups, the administrative services and the professional services. The professional services constitute about four-fifths of the personnel of a unit. The personnel, when properly organized and trained, can operate efficiently a hospital of 1000 beds. General hospitals of the communications zone are standard establishments with a normal capacity of 1000 patients, but they may be expanded in an emergency to care for more than that number. Two thousand should be the limit of expansion and then only temporarily in extreme emergency. These establishments are equipped to give definite medical and surgical treatment to all cases, but they do not necessarily do so. When once located, a general hospital usually remains in that place throughout the period of operations.

Hospital centers (T/O 8-511). (See Plate 7.) General hospitals are often grouped to form a hospital center. The unit consists of a *headquarters and service company*, a *center laboratory*, a *convalescent camp*, and the number of *general hospital units* assigned to the group. The center is commanded by a brigadier general, Medical Department. Each hospital center will require laundry, motor transport, bakery, and other quartermaster facilities and military police, finance, postal, and signal corps detachments. The amount of this additional personnel depends upon the size of the center. The total patient capacity of a center is dependent on the number of general hospitals assigned to it. A center with 3 general hospitals and 1 convalescent camp will have a normal capacity of 4000 beds. A center of 10 general hospitals will have a maximum capacity of 22,000 beds; this capacity includes crisis expansion.

COLUMN 16—REMARKS

The distribution of personnel indicated hereon is advisory, considerable variation being left to the discretion of the commanding officer of the hospital.

• Other services, if organized, will require additional officer, nurse, and enlisted personnel as well as certain specialized equipment.

- Executive officer.
- May be fire marshal.
- Dental.
- Quartermaster Corps.
- X-ray therapist.
- Chaplain.
- Adjutant.
- Medical Administrative Corps.
- May be post exchange officer.
- Includes—
 - 1 principal chief nurse.
 - 5 assistant chief nurses.
 - 1 medical technologist.

• When operating as part of a hospital center this transportation is pooled and operated under the supervision of the commander of the hospital center.

• The medical service includes—

1 lieutenant colonel, chief of medical service.

1 major, assistant chief of medical service.

6 majors, chiefs of the following sections:

- Gastroenterology section.
- Neuropsychiatric section.
- General medical section.
- Cardio-vascular section.
- Communicable disease section.
- Officer's section.

9 captains, ward officers, internists with special training in the following specialties:

- 1 tuberculosis.
- 1 neuropsychiatry.
- 1 allergy.
- 1 dermatology.
- 1 metabolism.
- 1 gastro-ontology.
- 1 cardiology.
- 1 neurology.
- 1 contagious disease.

4 lieutenants, ward and assistant ward officers.

• The surgical service includes—

- 1 lieutenant colonel, chief of surgical service.
- major, assistant chief of surgical service.

5 majors, chiefs of the following sections:

- Orthopedic section.
- Urologic section.
- Eye, ear, nose, and throat section.
- Septic surgery section.
- General surgery section.

10 captains, ward officers, with special training, as follows:

- 1 general operating surgeon.
- 1 oculist.
- 1 otolaryngologist.
- 1 brain surgeon.
- 1 thoraco-plastic surgeon.
- 1 maxillo-facial surgeon.
- 2 orthopedists.
- 1 urologist.
- 1 anaesthetist.

4 lieutenants, ward and assistant ward officers.

• The dental service includes—

- 1 major, chief of dental service.
- 2 captains, oral surgeons.
- 1 captain, prosthetist.
- 1 lieutenant, prosthetist.
- 2 lieutenants, general operators.

• Sanitary Corps.

Summary of specialists' ratings

Class	Num-ber	Class	Num-ber
1st	1	5th	55
2d	10	6th	116
3d	15		
4th	49	Total	245

In addition to the military personnel listed hereon, the services of the following civilians are required:

- 1 head dietitian.
- 7 dietitians.
- 1 head physical therapy aide.
- 7 physical therapy aides.
- 2 seamstresses.
- 3 dental hygienists.

The serial number symbol shown in parentheses for certain specialists is an inseparable part of the specialist designation. For qualification analysis see corresponding serial number in section VI, MR 1-8 (old number 1-3).

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	UNIT	Specification	Serial number	Specialists' Ratings (class)	Headquarters and Service Co.										
					Headquarters	General Headquarters Section	Company Headquarters Section	Band Section	Evacuation Section	Sanitation Section	Medical Supply Section	Center Laboratory	Convalescent Camp (B)	General Hospital (A)	Total Exclusive of General Hospital (C)
2	Brigadier general				1										1
3	Colonel				1 ^b										1
4	Lieutenant colonel				10 ^{1d}							1	1		12
5	Major				3 ^{1c}							1	3 ^{1d}		7
6	Captain				4 ^{1a}		1		1	1	1 ^a	1 ^a	3 ^{1d}		16
7	Lieutenant								1			2 ^a	6 ^{1d}		9
8	Total commissioned				19		1		2	1	1	6	16		46 ^{1c}
9	Warrant officers							1							1
10	Nurses				2										2
11	Master sergeant					1									1
12	Sergeant major	(052)			(1)										(1)
13	Technical sergeant					1	1	1				1	1		5
14	First sergeant	(585)				(1)							(1)		(2)
15	Chief clerk	(052)													(1)
16	Laboratory technician*	(051)										(1)			(1)
17	Bandman	(021)						(1)							(1)
18	Staff sergeant					4		1	1	1	1	2	5		15
19	Medical supply sergeant	(186)									(1)				(1)
20	Sanitary technician	(196)								(1)					(1)
21	Evacuation sergeant	(068)							(1)						(1)
22	Pharmacist*	(149)											(1)		(1)
23	Bandman	(021)						(1)							(1)
24	Clerk, record	(065)			(4)										(4)
25	Laboratory technician*	(051)										(2)			(2)
26	Platoon leader	(651)											(4)		(4)
27	Sergeant				8	2	4	2	2	2	2	2	13		35
28	Clerk, record	(055)			(8)										(8)
29	Ass't section sergeant	(652)							(2)						(2)
30	Company supply sergeant	(186)					(1)						(4)		(5)
31	Bandman	(021)						(4)							(4)
32	Pharmacist*	(149)											(1)		(1)
33	Technician, sanitary	(196)								(2)					(2)
34	Ass't supply sergeant	(186)									(2)				(2)
35	Technician, laboratory	(051)										(2)			(2)
36	Ass't platoon leader	(651)											(4)		(4)
37	Mess sergeant	(124)					(1)						(4)		(5)
38	Corporal					2	2	2	2	2	2	1	7		18
39	Company clerk	(655)					(1)						(1)		(2)
40	Technician, laboratory	(051)										(1)			(1)
41	Clerk, stock	(186)									(2)				(2)
42	Technician, sanitary	(196)								(2)					(2)
43	Assistant section leader	(652)				(1)		(2)					(6)		(9)
44	Bandman	(021)						(2)							(2)
45	Private, first class, and					31	14	20	32	15	17	18	100		82
46	Private, including:														105
47	Bandman	(021)	3d					(2)							(2)
48	Bandman	(021)	4th					(5)							(5)
49	Bandman	(021)	5th					(8)							(8)
50	Bandman	(021)	6th					(5)							(5)
51	Bugler	(021)				(1)							(2)		(3)
52	Carpenter, general	(046)	5th			(1)					(2)		(1)		(4)
53	Chauffeur	(245)	5th		(1)	(2)		(10)			(1)		(3)		(17)
54	Chauffeur	(245)	6th		(1)	(1)		(10)			(1)		(3)		(16)
55	Clerk, basic	(055)	6th		(4)			(4)	(1)		(1)	(2)			(12)
56	Clerk, headquarters	(055)	5th		(4)	(1)		(2)			(1)	(2)			(10)
57	Clerk, stock	(186)	4th								(2)				(2)
58	Clerk, stock	(186)	5th								(4)				(4)
59	Cook	(060)	3d			(2)							(4)		(6)
60	Cook	(060)	4th			(2)							(4)		(6)

Plate 7. T/O 8-511. Organization of the Hospital Center, Communications Zone.
(See next page.)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
					Headquarters and Service Co.										
1	UNIT	Serial number	Specialists' Ratings (class)	Headquarters	General Headquarters Section	Company Headquarters Section	Band Section	Evacuation Section	Sanitation Section	Medical Supply Section	Center Laboratory	Convalescent Camp (B)	General Hospital (A)	Total Exclusive of General Hospital (C)	Enlisted Cadre
61	Cook	(060)	5th									(4)		(4)	
62	Cook's helper	(521)										(12)		(12)	
63	Motorcyclist	(678)	5th		(2)	(1)					(1)	(1)		(5)	
64	Motorcyclist	(678)	6th		(2)	(1)						(1)		(4)	
65	Orderly	(695)			(6)	(2)					(1)	(3)		(12)	
66	Pharmacist	(149)	2d									(1)		(1)	(1)
67	Pharmacist	(149)	3d									(1)		(1)	(1)
68	Stenographer	(213)	3d		(3)							(2)		(5)	
69	Technician, dental	(167)	4th									(7)		(7)	(1)
70	Technician, laboratory	(051)	1st								(1)			(1)	(1)
71	Technician, laboratory	(051)	2d								(1)			(1)	(1)
72	Technician, laboratory	(051)	3d								(3)			(3)	(1)
73	Technician, laboratory	(051)	4th								(4)			(4)	(1)
74	Technician, laboratory	(051)	5th								(4)			(4)	(1)
75	Technician, medical	(123)	3d									(6)		(6)	(1)
76	Technician, medical	(123)	4th									(6)		(6)	(1)
77	Technician, medical	(123)	5th									(12)		(12)	(1)
78	Technician, sanitary	(196)	3d						(2)					(2)	(1)
79	Technician, sanitary	(196)	4th						(8)					(8)	(1)
80	Technician, surgical	(225)	4th									(3)		(3)	(1)
81	Technician, surgical	(225)	5th									(3)		(3)	(1)
82	Typist	(247)	4th		(4)			(2)		(1)	(1)	(2)		(10)	
83	Typist	(247)	5th		(4)					(1)				(5)	
84	Basic	(521)						(4)	(4)	(5)		(15)		(28)	
85	Total enlisted				45	19	28	37	20	22	24	126		321	25
86	Aggregate			21	45	20	29	39	21	23	30	142		374	25
87	Q-Ambulance, motor, cross country							20						20	
88	Q-Car, motor, sedan, 5-passenger			2	1							1		4	
89	Q-Motorcycle, with side car			4	2						1	2		9	
90	Q-Truck, ½-ton, pickup			1						1		4		6	
91	Q-Truck, 1½-ton, cargo			1						1		1		3	

(Tentative T/O, Oct. 9, 1940, as used at Medical Field Service School.) This table supersedes T/O 688 W, June 6, 1932.

REMARKS

A. Total patient capacity of center is dependent on the number of general hospitals assigned to the center. A center with 3 general hospitals and 1 convalescent camp will have a normal capacity of 4,000 beds. A center of 10 general hospitals will have a maximum capacity of 22,000 beds, this capacity includes crisis expansion.

B. Normal patient capacity, 1,000.

C. Each hospital center will require laundry, motor, transport, bakery and other Quartermaster personnel, also Military Police, Finance, Postal and Signal Corps detachments. The amount of this additional personnel depends upon the size of the centers and whether the centers are to be located in the Zone of the Interior or the Communication Zone.

^a May be Medical Administrative Corps.

^{aa} May be Medical Administrative Corps or Sanitary Corps.

^b Executive officer.

^c Chaplain.

^d Dental corps.

^e Includes:

- 1 Medical inspector.
- 1 Medical consultant.
- 1 Surgical consultant
- 1 Neuro-surgeon.

- 1 Orthopedist.
- 1 Thoracic surgeon.
- 1 Otorhinolaryngologist.
- 1 Dental.
- 1 Urologist-dermatologist.
- 1 Plastic and maxillo-facial consultant.
- * Medical Technologist.

Summary of Class	Specialists' Ratings: No.
1st	1
2d	2
3d	25
4th	51
5th	76
6th	37
Total	192

The serial number symbol shown in parenthesis is an inseparable part of the specialist designation. A number below 500 refers to an occupational specialist whose qualification analysis is found in Section I AR 615-26. A number above 500 refers to a Military occupational specialist, listed in the Index, Section II, AR 615-26.

Hospital centers are particularly advantageous in large field forces as they permit economy in Medical Department personnel, simplify supply and evacuation problems, and facilitate administration. Grouping permits specialization of hospital units and provides better treatment for patients, as the latter may be distributed directly from hospital trains to those hospitals best fitted for the treatment of particular types of cases.*

Hospital centers are not advantageous unless three or more general hospitals are grouped therein. The administrative overhead required is considerable, and economy in personnel does not result if a smaller number of general hospitals are grouped. Considerable time is required for the necessary construction. Hospital centers usually require new construction as existing buildings are not often available or adaptable to such large institutions.

Convalescent camps are located in the vicinity of and as a part of hospital centers. Their function is to relieve the general hospitals of the necessity for caring for patients who no longer need hospital treatment but who are not yet fit for duty and to restore to physical fitness such convalescents. The type camp has a capacity of 1000, although in actual practice it is equipped to accommodate 20 per cent of the total capacity of the center to which it belongs.

Station hospitals (T/O 8-508). (See Plate 8.) The personnel of this hospital unit is divided into two services, administrative and professional. Station hospitals for the theater of operations are establishments of the communication zone, having normal

1	Unit	2 Special- ists' ratings (class)	3 Normal capacity		
			250-bed	500-bed	750-bed
2	Colonel.....			1	1
3	Lieutenant colonel.....			(a1) 3	(a1) 3
4	Major.....		2	(d1) 6	(d1) 11
5	Captain.....		(b1d1) 11	(b4 a1 d1) 11	(b4 a1 d1) 15
6	First lieutenant.....		(b2 a1 d1) 7	(b1 d2) 11	(b1 d2) 16
7	Second lieutenant.....		b 1	b 3	b 3
8	Total commissioned.....		b 20	i 35	49
9	Nurse.....		(a1) 30	(a1'2) 60	(a1'3) 90
10	Master sergeant, including.....		1	2	2
11	Chief clerk (52).....		(1)	(2)	(3)
12	Technical sergeant, including.....		3	4	6
13	First sergeant.....		(1)	(1)	(1)
14	Chief clerk (52).....		(1)	(1)	(1)
15	Laboratory technician *.....		(1)	(1)	(1)
16	Male nurse *.....		(1)	(1)	(2)
17	Pharmacist *.....		(1)	(1)	(1)
18	Staff sergeant, including.....		5	11	14
19	Chemical laboratory technician *.....		(1)	(1)	(1)
20	Chief clerk (52).....		(1)	(1)	(1)
21	Clerk, general (55).....		(1)	(1)	(1)
22	Dental mechanic *.....		(1)	(1)	(1)
23	Mess (124).....		(1)	(2)	(3)
24	Section leader.....		(1)	(2)	(2)
25	Supply (186).....		(1)	(1)	(1)
26	Technician, medical (123).....		(1)	(1)	(2)
27	Technician, surgical (225).....		(1)	(1)	(1)
28	X-ray technician *.....		(1)	(1)	(1)
29	Sergeant, including.....		6	17	24
30	Basic.....		(3)	(4)	(5)
31	Chief clerk (52).....		(1)	(3)	(4)
32	Clerk, general (55).....		(1)	(2)	(3)
33	Meat and dairy hygienist *.....		(1)	(1)	(1)
34	Mess (124).....		(1)	(2)	(3)
35	Orthopedic mechanic *.....		(1)	(1)	(1)
36	Pharmacist (149).....		(1)	(1)	(1)
37	Supply (186).....		(1)	(1)	(1)
38	Technician, medical (123).....		(1)	(1)	(2)
39	Technician, sanitary (196).....		(1)	(1)	(1)
40	Technician, surgical (225).....		(1)	(1)	(1)
41	Transportation (14).....		(1)	(1)	(1)
42	Corporal, including.....		5	9	12
43	Basic.....		(5)	(9)	(12)
44	Private, first class.....		43	77	110
45	Private.....		87	155	222
46	Automobile mechanic (14).....	4th	(1)	(1)	(1)

Plate 8. T/O 8-508. Organization of the Station Hospital, Communications Zone.
(See next page.)

1	Unit	Specialists' ratings (class)	Normal capacity		
			250-bed	500-bed	750-bed
47	Baker (17).....	4th	(1)	(1)	(1)
48	Baker (17).....	5th		(1)	(1)
49	Bugler.....		(1)	(3)	(3)
50	Butcher (37).....	4th	(1)	(1)	(1)
51	Butcher (37).....	6th		(1)	(1)
52	Carpenter (50).....	4th	(1)	(1)	(1)
53	Chauffeur (245).....	5th	(2)	(3)	(4)
54	Chauffeur (245).....	6th	(4)	(6)	(8)
55	Chauffeur (245).....		(3)	(4)	(5)
56	Clerk, general (55).....	5th	(2)	(3)	(4)
57	Clerk, general (55).....	6th	(2)	(4)	(6)
58	Clerk, mail (56).....	2d		(1)	(1)
59	Clerk, mail (56).....	5th	(1)	(1)	(1)
60	Clerk, stock (186).....	5th	(1)	(2)	(4)
61	Cook (60).....	2d	(1)	(2)	(3)
62	Cook (60).....	4th	(2)	(6)	(9)
63	Cook (60).....	5th	(7)	(11)	(15)
64	Mechanic, general (121).....	5th	(1)	(2)	(3)
65	Motorcyclist.....		(1)	(1)	(2)
66	Operator, electric plant (77).....	4th	(1)	(1)	(1)
67	Painter (144).....	5th		(1)	(1)
68	Plumber (162).....	4th	(1)	(1)	(1)
69	Stenographer (213).....	3d	(1)	(2)	(3)
70	Technician, dental, X-ray (264).....	3d		(1)	(1)
71	Technician, dental (67).....	5th	(3)	(4)	(4)
72	Technician, laboratory (51).....	2d		(1)	(1)
73	Technician, laboratory (51).....	4th	(1)	(4)	(4)
74	Technician, laboratory (51).....	6th	(1)	(4)	(4)
75	Technician, medical (123).....	2d		(1)	(1)
76	Technician, medical (123).....	4th	(4)	(6)	(8)
77	Technician, medical (123).....	6th	(10)	(20)	(30)
78	Technician, pharmacist (149).....	4th	(1)	(1)	(1)
79	Technician, pharmacist (149).....	6th		(1)	(1)
80	Technician, sanitary (166).....	4th	(1)	(2)	(2)
81	Technician, surgical (225).....	1st		(1)	(1)
82	Technician, surgical (225).....	2d			(1)
83	Technician, surgical (225).....	3d	(1)	(2)	(3)
84	Technician, surgical (225).....	4th	(3)	(4)	(8)
85	Technician, surgical (225).....	6th	(6)	(12)	(18)
86	Technician, X-ray (264).....	3d	(1)	(2)	(3)
87	Technician, X-ray (264).....	6th	(1)	(2)	(3)
88	Typist (247).....	6th	(4)	(6)	(9)
89	Basic.....		(57)	(98)	(149)
90	Total enlisted.....		150	275	390
91	Aggregate.....		200	370	529
92	Q Ambulance, metropolitan.....		4	6	8
93	Q Car, light, 5-passenger, sedan.....		1	1	2
94	Q Motorcycle, with side car.....		1	1	2
95	Q Truck, 1½-ton, 4 x 4, cargo.....		2	2	3
96	Q Truck, 1½-ton, 4 x 4, dump.....			1	1
97	Q Truck, 2½-ton, 6 x 6, cargo.....		2	2	2
98	Q Truck, ½-ton, 4 x 4, reconnaissance.....				1

- Executive officer.
- Medical Administrative Corps.
- Adjutant.

- Dental.
- Principal chief nurse.
- Assistant chief nurse.
- Medical technologist.

Summary of specialists' ratings

Class	Number		
	250-bed hospital	500-bed hospital	750-bed hospital
1st.....	0	1	1
2d.....	1	5	7
3d.....	3	7	10
4th.....	19	29	38
5th.....	17	28	37
6th.....	28	56	80
Total.....	68	126	173

Plate 8. T/O 8-508. Organization of the Station Hospital, Communications Zone.
(See opposite page.)

Size of hospital	Head dietitian	Dietitian	Head physical therapy aide	Physical therapy aide	Seamstress	Dental hygienists
250-bed hospital.....	1	1	1	1	-----	1
500-bed hospital.....	1	3	1	3	1	2
750-bed hospital.....	1	5	1	5	2	2

The serial number symbol shown in parentheses for certain specialists is an inseparable part of the specialist designation. For qualification analysis see corresponding serial number in section VI, MR 1-8 (old number 1-3).

This table represents the normal personnel requirements for station hospitals of various capacities in the communications zone. The bed capacity authorized for these hospitals is 5 percent of the total strength they are designated to serve. (For example, a station hospital located where 5,000 military personnel are assembled should have a bed capacity of 250; where 10,000 are assembled a bed capacity of 500; and where 15,000 are assembled, a bed capacity of 750).

The administrative service ordinarily includes headquarters, registrar, receiving office, detachment of patients, medical detachment, medical supply, general supply and utilities, officer, detachment and patients' messes.

The professional service includes the medical, surgical, dental, laboratory, and roentgenological services.

The distribution of the personnel shown hereon to the various services of the hospital is left to the discretion of commanding officers of the hospitals.

For special qualifications and functional assignment of officers the following breakdown may be applied:

250-bed hospital—

- 1 lieutenant colonel, MC, commanding officer.
- 1 major, MC, chief of medical service (internist).
- 1 major, MC, chief of surgical service (general operating surgeon).
- 1 captain, MC, assistant operating surgeon (general operating surgeon).
- 1 captain, DC, chief of dental service (general operator).
- 1 captain, MAC, mess officer.

6 captains, MC, ward officers, with special training as follows:

- 1 neuropsychiatry.
- 1 internist.
- 1 eye, ear, nose, and throat.
- 1 radiologist.
- 1 orthopedic surgery.
- 1 venereal disease and dermatology.

1 lieutenant, MC, registrar and commanding officer, detachment patients.

- 1 lieutenant, MAC, detachment commander.
- 1 lieutenant, MAC, adjutant and fire marshal.
- 1 lieutenant, DC, general operator.
- 1 lieutenant, MC, clinical pathologist.
- 2 lieutenants, MC, ward and assistant ward officers, unclassified.
- 1 second lieutenant, MAC, supply and transportation officer.

500-bed hospital—

- 1 colonel, MC, commanding officer.
- 1 lieutenant colonel, MC, executive officer.
- 1 lieutenant colonel, MC, chief of medical service (internist).
- 1 lieutenant colonel, MC, chief of surgical service (general operating surgeon).
- 1 major, DC, chief of dental service (general operator).
- 1 major, MC, assistant chief of medical service (internist).
- 1 major, MC, assistant chief of surgical service (general operating surgeon).
- 1 major, MC, chief of laboratory service (clinical pathologist).
- 1 major, MC, chief of X-ray service (radiologist).
- 1 major, MC, registrar, commanding officer detachment patients, receiving officer.
- 1 captain, MAC, mess officer.
- 1 captain, MAC, adjutant.
- 1 captain, MAC, supply officer.
- 1 captain, DC, general operator.
- 1 captain, MAC, detachment commander.

6 captains, MC, ward officers with special training as follows:

- 1 neuropsychiatry.
- 1 internist.
- 1 eye, ear, nose, and throat.
- 1 orthopedic surgery.
- 1 venereal disease and dermatology.
- 1 cardiology.

2 lieutenants, DC, general operators.

- 1 lieutenant, MAC, assistant detachment commander.
- 1 lieutenant, MC, assistant laboratory officer (clinical pathologist).
- 7 lieutenants, MC, ward and assistant ward officers, unclassified.
- 1 second lieutenant, MAC, assistant adjutant, fire marshal, transportation officer.
- 1 second lieutenant, MAC, assistant registrar.
- 1 second lieutenant, MAC, assistant mess officer.

750-bed hospital—Same as 500-bed hospital, with the following added:

5 majors, MC, chiefs of the following sections:

- 1 general medical section.
- 1 general surgery section.
- 1 officers' section.
- 1 neuropsychiatric section.
- 1 communicable disease section.

4 captains, MC, ward officers, unclassified.

5 lieutenants, MC, ward and assistant ward officers, unclassified.

capacities of 250 beds, 500 beds, or 750 beds depending upon the number of troops they are designated to serve. They render general medical and surgical treatment for those areas where there are sufficient military populations to justify their maintenance but not sufficient to justify general hospitals.

Geographical Distribution of Fixed Hospitalization (Beds). The railway net in a theatre of operations is an important factor to consider both as to the organization of the theatre and the conduct of military operations. It is particularly true regarding the medical service. The arrangement of the transportation lines controls not only the location of the evacuation hospitals in the combat zone but also the location of the general hospitals of the communications zone. The latter are located with relation to the main lines of railway traffic. Keeping in close touch with existing and prospective military operations, particularly with reference to sectors where the maximum effort is to be made, the chief surgeon of the field force should recommend the distribution of general hospitals along railway lines radiating from regulating stations. In all contemplated military operations tentative locations for regulating stations should be selected as far in advance as possible. These are essential data, and only when the surgeon has them at hand can he recommend intelligently and develop an adequate hospitalization program. General hospitals must also be located with regard to their safety, that is, removed from the combat area a sufficient distance so that a military reverse may not disturb their functioning. The important things to bear in mind as to location of fixed hospitals are:

The principles governing the geographical distribution of hospitals.

That the hospitalization project must meet the conditions pertinent to the particular theatre of operations considered.

Temporary needs. Occasional provision must also be made for immediate local requirements in the case of troops being sent into territory where no established hospitalization exists. The chief surgeon must be informed of any contemplated movements of this nature in order that steps may be taken in advance to provide proper hospitalization for such detached forces. If the new area to be taken over is to be permanently occupied, fixed hospitals must be provided; if for temporary occupancy, mobile organizations, such as hospital companies and evacuation hospitals, may accompany the troops and provide for their temporary needs.

Tactical coordination. The chief surgeon of a field force, having in mind a comprehensive estimate of the problem with which he is confronted, cannot act independently in making recommendations for the location of hospitals. This feature has a strategic application. The chief surgeon must be admitted to the council of the high command and kept familiar with the details of contemplated operations. Only by knowing these details in advance can he be expected to establish adequate, fixed hospitalization.

Development of Hospitalization Program. The chief surgeon of the field force must have the following information:

The total number of beds he is authorized to establish (computation on existing strength and estimated strength 6 months later).

The strategical plans contemplated.

Locations selected and tentatively selected for the regulating stations.

He then proceeds as follows:

Plan. By map study or actual inspection of the facilities along the traffic routes, he selects tentative sites for fixed hospitalization and decides upon the number of beds to be located on each site selected. Buildings which are wholly suitable for conversion into large hospitals are not so common as one might suppose. They are often located so they cannot be used advantageously. The arrangements of buildings and rooms are often such that patients cannot be grouped, much space is wasted, and a large personnel is required to operate the institution. This statement applies to many of our civil hospitals. However, in war, the time element may mean everything. The exploitation of local resources is necessary, particularly in the early stages of a war. New construction has many advantages and, if a war is prolonged, usually gives the best results. New hospital may be established where needed, permitting patients to be grouped for more specialized treatment, a process which requires fewer attendants. However, construction takes time

In undertaking a program of wartime hospital construction, the military situation must be predicted months in advance. If this estimate is erroneous, hospitals may be so located as to be of little use.

Coordination and approval of tentative plan. In conference with G-4, GHQ, decision is made by the latter as to whether the locations selected can be made available for the Medical Department and whether the site contemplated will fit into the general supply and evacuation system. This coordination by G-4 is very essential because experience will show that frequently other activities are seeking or have already been granted authority to use the site desired by the chief surgeon.

Inspection of locations. The tentative selection of sites having been approved by G-4, a board of officers inspects the sites, considers the local resources, and arrives at a decision as to whether the project contemplated for each site is practicable. Such a board of officers should consist of a representative of the hospitalization section of the office of the surgeon, communications zone; a representative of the Engineer Corps who is an expert on construction, water, and sewage matters; and another who is a railroad transportation expert.

Project approval. This board reports to G-4, GHQ. On approval of a project by GHQ, the matter of leasing sites and buildings and their alteration or new construction is turned over to the communications zone authorities for accomplishment.

Method of Leasing a Site. When sites are taken over for military purposes, through amicable agreement with the tenants, the owners, occupants of occupied territory, are guaranteed a reasonable remuneration. Knowing the boundaries of the land to be leased, the communications zone quartermaster representative (Rents, Requisitions, and Claims) by reference to the local records, ascertains the name and holdings of the various owners within the general boundaries of the site chosen and negotiates the lease. Combined in or attached to the lease must be a complete description of the property, with improvements taken over. In taking over a site for a military project, rarely should it become necessary to resort to military requisition. However, if this must be done, essentially the same procedures as above outlined, particularly with reference to proper classification and preparation of the records, should be followed, adhering to the prevailing laws and customs. Even in the face of failure to obtain the signature of the tenant or his representative to an amicable agreement, his interest in the matter must be carefully safeguarded.

Taking Over Existing Buildings. When existing buildings suitable for hospital purposes are selected by the chief surgeon and approved by the commander in chief of the field force, or in special cases by the commanding general, communications zone, they are taken over subject to coordination by local and higher commanders, provided they are government buildings. If private institutions they are acquired either by amicable leasing or military requisition.

Inventory. A very careful inventory must be made at once by the medical officer in command of the unit designated to occupy it and a representative of the Rents, Requisitions, and Claims Department or some local representative designated for the purpose. The condition of the buildings and all their contents taken over are surveyed particularly with reference to existing damage or evidences of wear and tear.

Space. As each general hospital unit requires a minimum of 120,000 square feet of floor space, it will readily be seen that buildings taken over should be large. Those with many small rooms are not desirable. Those having large rooms, well lighted and ventilated and easily heated, are most suitable. A location on or near a railroad siding that will accommodate a hospital train is desirable. A standard station hospital requires 32,000 square feet of shelter. If all the shelter necessary is not available in the building or group of buildings to be utilized for hospital purposes, such buildings as exist can be used as a nucleus around which can be erected portable huts or emergency tents to bring the unit up to the required capacity.

Adaptability. As a rule the use of hotels, particularly those of the small type, and of large private residential estates should be avoided until all other resources have been exhausted. These holdings are often inaccessible, usually poorly adapted for hospital purposes, and are always subjected to damage through occupancy; they are expensive to maintain, require considerable alteration to render them suitable for hospital purposes and, if

not enemy property, must be restored to their original condition when returned to the owners. Buildings taken over in this manner are usually occupied by a single unit, but frequently in cities or large towns a sufficient number of buildings may be taken over so as to permit the grouping of three or more units in a "hospital center."

Process of Realizing a Construction Program. As before noted, the commanding general, communications zone, receives from general headquarters a directive to construct a certain hospital. This intentional divorce of the agency which prescribes a policy from the agency which executes it is important. Upon receiving the order for hospital construction, the commanding general, communications zone, transmits it to the chief engineer (Construction Corps) for action. The chief engineer in cooperation with the chief surgeon, communications zone, prepares a proposed layout of the hospital units to be constructed on that site. Construction may be carried on either by troops or by civilian contractors. An officer of the Engineer Corps (Construction) is detailed as local representative and placed in charge of the work. He reports frequently to his chief as to the progress being made on the project. These reports from those in charge of construction in various localities are consolidated each month, usually on a graph, and furnished the various officials including the chief surgeon concerned. When a unit nears completion, the officer charged with construction keeps the chief surgeon informed as to the probable time at which it will be ready for occupancy by the Medical Department.

Standardization of Hospital Construction. Plans and specifications for standardized or type hospitals which bore the test of experience are now on hand. In constructing new hospitals in the theatre of operations all refinements must be eliminated. The basis of construction should be the use of knocked-down buildings of the hut type. These may be mill-fabricated and prepared either in the theatre of operations or elsewhere. Where wood is scarce other available material, for example, concrete, tile, adobe, stone, brick, etc., should be utilized, though still adhering to the type of construction prescribed in the plans. The erection of such buildings is a comparatively simple task once the material is at the site. The necessity of building roads before beginning the erection of buildings is paramount. The installation of water and lighting systems is necessary. Sewage installations may not be contemplated unless it is feasible to link up the hospital system with an existing sewage artery. Without sewage installations for the disposal of excrement, incineration must be the main reliance. In many localities, depending upon the character of the soil encountered, seepage pits must be used for the disposal of fluid wastes. At all large hospitals and particularly at hospital centers adequate railroad sidings for hospital trains and supply trains, with loading and unloading platforms, must be provided in order that the main line of traffic may not become blocked.

Summary of Responsibilities. Summarizing, it may be said that the following military agencies or personages are concerned with the development of a hospitalization project or program:

The *commander* of the field force, as he is charged with the conduct of all matters within the theatre of operations.

The *chief surgeon*, as he controls all Medical Department activities within the theatre of operations. He is responsible for the general plan of hospitalization, selects the tentative sites for fixed hospitals, and determines the number of beds to be located at each site selected.

G-4, GHQ, as he coordinates Medical Department requirements with those of other activities and makes decision as to the availability of the sites selected.

The *engineer*, as he passes on the practicability of the sites selected from the standpoint of transportation, construction and local resources, including power, water, and sewage.

The *commanding general, communications zone*, as he commands the communication zone and is responsible for the execution of the projects or policies directed by GHQ.

The *engineer, communications zone*, as he is responsible for construction, transportation and utilities.

The *quartermaster, communications zone*, as he obtains sites and buildings, by lease or otherwise.

The *surgeon, communications zone*, as he is responsible under the commanding general for Medical Department activities within the communications zone.

G-4, communications zone, as he coordinates the activities of operating agencies within the communications zone.

The *Engineer, Quartermaster, Signal, Medical Department, and other supply branches* are also concerned, as they contribute to the equipment of hospital installations.

General Principles of Evacuation. Our present system or method of evacuation is an evolution of that employed in the World War, although the general doctrines governing it were in operation during the later years of the Civil War. There are certain general principles which control efficient evacuation. Beginning with the moment that a man is wounded at the front, there must be a continuity in his handling and treatment until he is again fit for release from the control of the Medical Department. Commencing at the front, there is a constant sorting of casualties with a view of determining which are to be evacuated and how. All cases who can perform duty and are not a menace to the health of the command are returned to their organization as promptly as possible. No cases are sent farther to the rear than the military situation and their own condition demand. Cases which can be treated successfully within a command are not evacuated unless it is necessary to relieve the command of their care in order to free it for movement or to make room for new cases. Serious cases are transported the shortest possible distance consistent with the military situation and their proper treatment. Cases requiring prolonged treatment are sent to the communications zone and from there to the zone of the interior. The medical personnel attached to each unit collects and gives immediate care to casualties within its own area. Evacuation from each area is made by units in rear thereof. During periods of activity, casualties are evacuated rapidly through forward clearing stations and hospitals to the communications zone; in periods of inactivity, the evacuations are less numerous and less rapid. Plans and orders for evacuation are made in conformity with combat plans and orders. The proper execution of evacuation requires that the medical service be familiar with the combat plan in ample time for it to make proper arrangements.

Bed Requirements for Combat. It has been intimated before that evacuation presumes established beds to which the wounded may be evacuated. Arrangements for evacuation for any given combat operation must, therefore, include provisions for hospitalization. In estimating the number of fixed beds to be made available to meet the requirements of a single severe engagement, the losses of the 1st Division in the Aisne-Marne operations, July 18-23, 1918, may be taken as a basis.

The rates given below are daily rates for a severe engagement, not average rates.

Infantry regiment	12-15 per cent
Infantry division	6- 8 per cent
Infantry corps	3 per cent

These rates include the killed: (16 per cent to 20 per cent of all casualties).

The ratio of killed to the wounded by gas and gunshot missiles is 1:6.

The ratio of killed to the wounded alone is 1:4.

In making an estimate as to the number of beds to be made available to meet the needs of one field army, the number of front line divisions engaged may be taken as a basis. This will usually be a more accurate method of estimating than by using a casualty rate for the corps or for the army in entirety. All divisions will not be engaged in severe combat, hence an average casualty rate of 6 per cent is a liberal estimate. The great majority of corps and army troops are not subjected to hostile fire as are the divisional troops; neither are all corps likely to be engaged equally. Thus one army of 9 divisions may have 7 front line divisions engaged:

Troops engaged, 154,000 \times .06 = 9240 casualties, of which 16 per cent (1478) are killed.

9240 minus 1478 equals 7762 wounded and gassed.

While some of these casualties will not reach fixed hospitalization, some sick from the entire army will do so. These factors should partially equalize themselves. There will also be some battle casualties among corps and army troops. On this basis, it may be estimated that 8000 fixed beds should be available for an army with 7 divisions in the

front line for each day of severe fighting. Available beds to meet evacuation requirements for expected engagements will vary from these figures (or more) to those required to meet the average rates given in paragraph, "Hospital Allowances," above.

Policy of Evacuation. The general policies regarding evacuation and hospitalization within the theatre of operations are formulated by general headquarters. The methods of carrying out these policies is described later.

Classification. Evacuation includes two classifications, primary and secondary. *Primary evacuation* includes evacuation within the theatre of operations, while *secondary evacuation* includes that from the theatre of operations to the zone of the interior. The policy of evacuation, announced by general headquarters, determines what classes of casualties are to be treated in the theatre of operations and what classes are to be sent to the zone of the interior. What the policy may be has a great influence on the medical activities of the communications zone and affects particularly the hospitalization project of this zone. The few who do finally return to duty will do so after prolonged treatment and probably will be fit only for special service. Therefore, the total number of patients, less the percentages adjudged to be permanently incapacitated, should be the maximum treated in the theatre of operations.

Primary evacuation within the theatre of operations is of two types: evacuation to army (combat zone) hospitals and evacuation to communications zone hospitals. It is with the latter that the discussion of evacuation will deal. Evacuation within the communications zone is often necessary. Although this is in the nature of a secondary evacuation, the term "secondary evacuation" refers to the transfer of casualties to the zone of the interior.

Means of Evacuation (FM 8-35). The means of transporting sick and wounded from evacuation hospitals in the combat zone to a hospital in the communications zone consist of *hospital trains, trains for patients, hospital ships, hospital boats*, and, occasionally, *motor convoys* and *airplane ambulances*. The usual method of transporting patients from the evacuation hospitals in the combat zone to general hospitals in the communications zone is by means of hospital trains.

Hospital trains. (T/O 8-506). Hospital trains are Medical Department organizations, the type train having a capacity of 300 recumbent patients. Their distribution and use is controlled by the Medical Department. As regards personnel, supply, and maintenance of their medical equipment, they are administered under the direction of the chief surgeon of the field force except those assigned for evacuation within the communications zone. As railway units, they are operated and maintained mechanically under the direction of the Corps of Engineers. The number of hospital trains required depends on the type and severity of combat and the location of the theatre of operations and the conditions existing within it. In a large theatre of operations they should be provided at the rate of 2 per combat division for the first 20 divisions and 1 per each additional division thereafter. Hospital trains are of two types, the *standard* and the *improvised*.

The *standard hospital train* as used in the World War consisted of 16 cars, of which 10 were ward cars exclusively devoted to carrying the sick and wounded and the remaining 6 were given over to administration, messes, pharmacy, operating room, train personnel, and stores. The train had a capacity of 360 patients recumbent and 720 sitting. In the ward cars, the beds, 36 in number, especially designed, were removable and in case of necessity could be used as litters and could be folded against the side of the coach or lowered to the floor. In the double tier arrangement, the lower tier may be used as a settee while the top tier is still being used for recumbent cases. By this arrangement the less seriously wounded are made comfortable and can either sit or lie down. A so-called "sitting case" cannot remain so for a prolonged period; it is therefore necessary during a long journey to provide beds for sitting patients. As far as personnel, material, supply, and other conveniences are concerned, trains of this type are virtually rolling hospitals. They must be vested to permit the serving of hot meals and the giving of surgical attention enroute.

Another type of hospital train employed is one made up of the desired number of ordinary Pullman or tourist sleeping cars, and engine and baggage car to which is added a so-called "unit car." The unit car may be an altered baggage, coach, or dining

car; it contains the kitchen, pharmacy, operating room, a few beds for special cases, and other facilities needed by patients en route. While such trains lack the refinements found in the standard hospital train, their use offers certain advantages of which the most important are availability, economy, and flexibility. Trains of this type may be made large or small to suit the demands of each journey. The type train, however, is considered as having a capacity of 300 recumbent patients.

Agencies Involved in Evacuation. The agencies involved in the process of evacuation from the combat zone to the communications zone are: the *evacuation hospital*, the *hospital train (or boat)*, the *surgeon army*, the *G-4 army*, the *regulating station*, the *chief surgeon of the field force* and *G-4, GHQ*. The surgeon of the communications zone also has a function in that he allots specific "bed credits" to regulating officers. The regulating stations play the most important role in insuring expeditious evacuation. These stations are the agencies which control the movement of all sick and wounded evacuated from the mobile medical installations of the combat zone to the fixed hospitals in the communications zone.

Regulating Stations. Regulating stations are established and administered under the direction of G-4, general headquarters. Each regulating station serves a definite area, usually one army. They are usually located in the rear of such areas at controlling points where the necessary trackage exists or can be quickly installed. They should be near enough to the front so that trains can arrive at railheads in 12 hours. They should have 2 railroad lines to the front and rear and also a line for lateral movement. The limits of the army areas are therefore often fixed by general headquarters with these particular features in mind. A regulating station consists of a rather large railroad yard with a sufficient number of tracks, with the necessary crossovers, switches, sidetracks, and facilities for handling a one day's supply of food, forage, ammunition, and other items that might be kept there for urgent use.

Regulating officer. The regulating officer commands the station and all installations thereat for the operation of which the use of trackage or of routes leading to the front is necessary. He is a direct representative of the commander of the theatre of operations, who assigns him a suitable staff representing the various services. Priorities in movements from rear to front are fixed by the regulating officer pursuant to the demands of the command that his station serves. All calls for supplies, all notices and requests for troop movements, and all requests for evacuation are sent to the regulating officer who, in accordance with these advices, controls the flow of supply and movements between front and rear.

Medical Department Activities at Regulating Stations. *Medical Regulator.* At the regulating station there is a medical group on the staff of the regulating officer. The senior of this group is known as the "medical regulator." This officer supervises the movement of hospital trains and handles all evacuation matters. The commanding officers of hospital trains assigned to his station are directly answerable to him in all matters pertaining to Medical Department administration. A veterinary officer is detailed as an assistant to the medical regulator to handle matters relative to the evacuation of animals.

The regulating officer (or medical regulator), upon the receipt of a call from G-4 of the army, will assign trains and arrange the necessary schedule, advising the evacuation hospital and the G-4 of the probable time of arrival and the period of time allotted for loading and the class of cases that can be loaded on it. The commanding officer of the evacuation hospital will be charged with seeing that the necessary steps are taken in order that the train may be promptly loaded in the time allotted. Specific loading directions as to the class of cases to be taken abroad are necessary, as the medical regulator may order the train on its trip to stop at other hospitals to take on selected cases. In directing a movement of this sort, the medical regulator is guided by the availability of beds in the rear. These beds are allotted daily by the surgeon, communications zone, as noted below.

Data. Hospital trains are assigned to or placed under the immediate control of regulating stations by G-4, GHQ, on the recommendation of the chief surgeon of the field force. Suitable railroad yards for them are designated by the regulating officer. With the

requisite number of hospital trains at his disposition the medical regulator must be furnished daily with two essential data:

First, regular reports from the front (G-4, Army) as to the number of patients he will be expected to evacuate by hospital train. These "reports" will frequently be direct requests to evacuate specific hospitals in definite priorities instead of routine information.

Second, regular reports from the rear as to the number of beds available to which patients can be evacuated.

Reports. Evacuation hospitals report daily or as often as may be necessary to G-4 Army (through the army surgeon) the following information:

Number of evacuable wounded, sitting and lying cases.

Number of non-evacuable wounded.

Number of evacuable sick, sitting and lying cases.

Number of non-evacuable sick.

Number of vacant beds.

Bed credits. The surgeon, communications zone, maintains in his office a daily balance in terms of beds, showing the current condition of hospitalization resources. Each general and station hospital in operation notifies him daily by telephone, telegraph, or mail, of certain essential data, among which are the total number of vacant beds and the number of patients in hospital. These he tabulates and from the aggregate so obtained reviews the general situation and makes allotments for primary or other evacuation movements. The surgeon, communications zone, wires daily to the medical regulator the number of beds set aside exclusively to receive evacuations being handled through that particular regulating station. Once these allotments are made they cannot be changed except by mutual consent of these two officials.

The medical regulator must always know that his credit in terms of beds at certain hospitals is at par until he himself has used it; otherwise, confusion in the movements of hospital trains and needless suffering on the part of the patients might ensue. A bed-credit in a specific hospital is of little use to a regulating officer unless the credit is at least 300 beds, that is, enough to take one train load of patients. In emergencies and particularly with sudden changes in the battle front, the chief surgeon may set aside certain hospitals in the forward areas of the communications zone for use by the medical regulator, notifying the surgeon, communications zone, promptly as to this action and at the same time directing the hospital commanders to report the number of vacant beds direct to the medical regulator. Bed-credits in a specific hospital center (or general hospital) should be allotted to a single regulating station only.

A practicable arrangement that was occasionally sanctioned during the World War was to permit regulating stations to "trade" bed-credits. That is, when one station became short of bed-credits or desired to avoid a long haul on account of the type of train being used, the medical regulator at one station called up the regulator at another station and requested an allotment to him of a requisite number of beds at some hospital credited to the later. As soon as this was done, the beds so loaned passed out of the control of the second regulator and were stricken from his daily balance as no longer available. During a big drive, when it is necessary to relieve evacuation hospitals of their encumbrance of wounded, it may become necessary to evacuate patients before they have received surgical treatment. Such cases are classed as "pre-operative" and are sent to general hospitals in the forward areas of the communications zone.

Regulation of trains. In addition to regulating evacuations, the medical regulator must work in close touch with the railroad technicians as to the movements of empty trains on return trips as well as for the preparation of "operating schedules" for the loaded trains. When the latter are not kept constantly moving, space where they can be sidetracked, yet remain available for use in any emergency, must also be designated. The medical regulator is the representative of the chief surgeon of the field force in all matters relating to the medical personnel on the trains and, under the direction of the regulating officer, he must also provide facilities for the supply of rations, general medical supplies, distribution of mail, and for rations for patients. The latter is most important. Trains

entering the combat zone must carry with them sufficient rations to feed the capacity of the train throughout the journey.

Evacuation within the Communications Zone. *Allotment of trains.* In addition to the trains specifically assigned to regulating stations, a number of hospital trains are placed by G-4, GHQ, directly under the control of the commanding general, communications zone, and held at suitable places designated by the latter. These trains are utilized in accomplishing what may be termed "communications zone" evacuation or "intermediate" evacuation. This is a second stage of primary evacuation. Train movements are coordinated by G-4 at headquarters communications zone on recommendations of the surgeon, communications zone. Through a working agreement usually sanctioned by G-4, the surgeon, communications zone, calls direct upon the Director of Transportation for such movement of those hospital trains as the Medical Department may desire.

Necessity for evacuation. Evacuations from the communications zone become necessary because approximately 20 per cent of all sick and wounded remaining under treatment for more than two weeks become permanently incapacitated for further military duty and require evacuation to the home territory for eventual discharge from the service. This fact alone necessitates a constant flow of such patients to hospitals at base ports, or where water transportation is not necessary to those hospitals near important railway junctions serving as exits to home territory. During periods of comparative inactivity at the front the medical regulator attempts to select patients for evacuation from the combat zone and to route them to those hospitals of the communications zone that are best qualified to render the particular treatment required. Thus he may direct a hospital train to call at several evacuation hospitals and to transport all fracture cases to a general hospital peculiarly equipped to take care of them. Likewise, he may select those patients offering prospects of speedy recovery and return to duty and direct their transfer to hospitals near the front. This reduces the mileage demands on rolling stock and facilitates replacement procedure. However, in times of stress, a medical regulator can seldom afford to observe this desirable selection of patients or to make primary evacuations far to the rear. By doing so, he would suffer considerable loss in the "utility schedule" of his hospital trains.

Whenever combat activity becomes intensive, with great numbers of sick and wounded flowing into the evacuation hospitals, the medical regulator, guided by his bed allotments, is forced to play safe and prescribe the shortest trips possible for the hospital trains under his control, in order that his resources may be utilized to maximum advantage. The medical regulator relies upon the surgeon, communications zone, to accomplish communications zone evacuation and keep the hospitals near the front as empty as possible. Therefore, in very active periods, instances will arise where a hospital may be receiving patients from the front on a hospital train dispatched by the medical regulator, and at the same time be sending out to hospitals toward the base specially selected patients on trains independently ordered up for that purpose by the surgeon, communications zone.

Hospital trains operating under communications zone control usually cover much greater distances in quicker time than can be done by hospital trains operating in the combat zone. In the combat zone, the *daily traffic density* may reach 72 trains per 24 hours, a supply, troop or hospital train passing through a given station every 20 minutes. When rail lines are thus crowded, movement is slow.

Secondary Evacuation. Evacuation to the home territory by hospital ships or by hospital trains requires no special description as they resolve themselves into those of routine selection, classification, formation into sick and wounded convoys for purposes of record, delousing whenever necessary, and transfer as accommodations become available. During the World War ordinary troop ships and not hospital ships were generally utilized. While aboard ship, the sick and wounded being transported to the United States were under the control of the Navy by special agreement entered into between the Secretaries of War and Navy. Upon debarkation, the patients reverted to the control of the Army and were distributed from debarkation hospitals at the ports to the military hospitals throughout the country. Hospital trains of the zone of the interior were operated in a manner similar to that used in operating hospital trains under communications zone control. When the communications zone adjoins the zone of the interior, hospital trains pass from one zone to the other. In this case there is joint control, movements in and

out of the theatre of operations being controlled by a regulating station near the rear boundary of the communications zone, and movements within the interior being controlled by agencies of the latter.

PERSONNEL

Responsibility. The chief surgeon of the field force is responsible for Medical Department personnel matters relative to requirements, distribution, priority of replacement, and training in accordance with the general policies of the commander of the field forces. Medical Department personnel within the theatre of operations is administered and controlled in accordance with the policies announced for all classes of personnel within the force, the major part of this administration being performed by the organization to which the officers, soldiers, or nurses are attached or assigned or of which they are an integral part. The surgeon's office, communications zone, functions as an administrative agency in carrying out the policies of general headquarters. As such it initiates all actions looking toward the distribution of the great numbers of Medical Department personnel required by an expeditionary force.

The Personnel Section, Office of the Surgeon, Communications Zone. The primary function of the personnel section of the communications zone surgeon's office is the distribution of Medical Department personnel. This section, however, does not work alone. The other sections of the office are interested to some extent in personnel matters. Each activity within the theatre involves medical personnel. Successful handling of personnel matters is dependent on a well-organized personnel section which coordinates the demands made upon it. Its principal contacts will be with G-1, the Adjutant General, and with those sections of his own office that are particularly interested in the distribution of professional talent. The chief of this section should be an officer of the permanent establishment whose experience has given him a broad acquaintance with the medical profession of the nation and with the members of his own corps. Advice with reference to dental, veterinary, and nursing personnel questions must always be available to this section of the office; a representative of these corps should therefore be on duty therein.

Classes and Distribution of Medical Department Personnel. The Medical Department is responsible for the procurement and distribution of the following classes of personnel:

Commissioned:

Medical Corps.

Dental Corps.

Veterinary Corps.

Medical Administrative Corps.

Nurses:

Nurse Corps—graduate.

Nurse's Aides—undergraduate.

Enlisted:

Medical Service.

Dental Service.

Veterinary Service.

Civilian:

Dieticians.

Physiotherapists.

Clerks and others.

This personnel is dispersed throughout a field force in one or another status as follows:

Assigned to units.

Attached to organizations.

Detailed as representatives.

Replacements.

Detailed to civil work or with relief societies.

Percentage of Medical Department Personnel. The percentage of Medical Department personnel in a field force varies according to several factors, the principal one being the general nature of the military effort which determines the amount of fixed hospitalization that is to be established in the theatre of operations. Taking into consideration all military forces, in both the zone of the interior and the theatre of operations, it is estimated that Medical Department personnel will constitute approximately 12 per cent of the aggregate military personnel required for a major effort. In a minor effort, where comparatively little combat is expected, the proportion would be smaller. War strength tables of organization are based upon a contemplated major effort in which the Medical Department requirements are estimated as follows:

Officers	1.2 per cent
Nurses .....	.8
Enlisted	10.5

12.5 per cent

Classification. A detailed percentage classification may be given as follows:

Commissioned:

Medical Corps .....	.75 per cent
Dental Corps .....	.1
Veterinary Corps and Sanitary Corps .....	.3
Medical Administrative Corps .....	.05

1.2

Enlisted:

Medical Department (including medical and dental attendants), approximately	9.5
Veterinary Corps	1.

10.5

Nurses:

Nurse Corps8
TOTAL	12.5 per cent

Basis for Estimating Medical Personnel. The Medical Department personnel required in either the combat zone or the communications zone cannot be estimated with any degree of accuracy without a knowledge of the specific theatre of operations and of the organizations of the forces thereof.

While it is sound policy to assume that Tables of Organization show all the personnel required within a field force, experience has shown that in practice the medical personnel problem presents difficulties if the allowances given in Tables of Organization are adhered to strictly. Unusual or un-anticipated situations are almost certain to occur in connection with combat activities. Medical establishments are often obliged to care for more than double the number of patients for which they were organized. Differences therefore may exist between the totals shown on Tables of Organization and the total medical troops actually required in a given theatre of operations. In planning for the organization of a field force, each theatre of operations will present a different problem. Medical personnel should therefore be considered not only on a table of organization basis but also on the basis of estimated needs. Whether the latter should be on a percentage basis is immaterial except that such is a convenient method in keeping track of the medical personnel accruing to the field force.

A specific war plan must further indicate the basis upon which medical units will accrue to the credit of the forces. It is desirable to stress the statement that the Medical Department personnel that is to accrue to the credit of the force must keep pace with or be slightly in advance of the authorized allowance based upon the strength and composition of the forces in question. Experience in France indicates that this is a policy difficult to maintain. Changing conditions in a theatre of operations demand changes in the rate of delivery of combat troops to the theatre. If the flow of medical personnel to the theatre does not keep pace with the flow of combat troops, just that much will the operations of the combat forces be hampered by lack of medical support.

Personnel Replacements. It is essential that medical units within the theatre of operations be maintained at full strength if they are to function efficiently. Provisions for replacement of personnel is an important feature of any war plan, the rate varying according to circumstances. From past experiences it appears that not enough consideration has been given to this subject. The matter of furnishing trained replacements to a field force is a function of the zone of the interior. The chief surgeon in the theatre of operations, however, is materially concerned as to Medical Department replacements and must make representations as to his requirements when necessary. The administrative details necessary to the distribution of replacements, once they arrive, are functions of the com-

munications zone authorities. The priority of such distribution is made in accordance with the policy of general headquarters. Priority is usually given to the combat zone, although such a policy may not always be desirable regarding medical replacements. In order to permit flexibility, replacements are echeloned in depth. In a small field force, medical replacements, except perhaps in the case of nurses, may be advantageously placed in the general replacement pool, depot, or battalion. With a large field force, however, many advantages are offered if medical replacements within the communications zone can be grouped in camps or areas controlled by the Medical Department, i.e., Medical Department Concentration Centers.

Concentration and Distribution of Medical Department Personnel and Units. Depending on the character of the theatre of operations and the geographical distribution of the field forces, one or more Medical Department Concentration Centers are established in the communications zone.

Medical Department Concentration Centers (T/O 8-505). If only one center is established, it should be centrally located at a place having good communications with the front and rear, but particularly with the front. It should also be near a communications zone medical depot. In the case of a deep communications zone, two such centers are desirable. One of these should be at the base, situated on or within easy reach of the avenues of approach into the theatre of operations. The other should be well forwarded and centrally located behind the combat zone. These centers serve not only as reservoirs for the reception and distribution of replacements; they have other functions which are perhaps more important.

Incoming units. All Medical Department troops arriving in the theatre of operations, except those regiments and detachments that are components of divisions, should be sent to the concentration center at the base unless they are to be immediately assigned to operate an establishment. The medical units pertaining to the communications zone (general and station hospitals, laboratories, veterinary general and station hospitals, etc.) and those belonging to the army medical service (evacuation and surgical hospitals, etc.) all require bulky equipment. The personnel of these units will ordinarily arrive in the theatre of operations unaccompanied by this equipment. The concentration of this personnel under coordinated central control at a center facilitates their administration and distribution, permits them to continue training under proper supervision, and allows the assembly of their equipment. It is not contemplated that the equipment necessary to operate communications zone establishments, such as hospitals, be sent to a center. These supplies are forwarded by supply agencies to the places where the establishments are to be located. The mobile units of the army medical service may be furnished their organizational equipment at the center. This may be done either at the center, at the base, or in the forward area of the communications zone, depending on the policy of GHQ. The equipping of the units is greatly facilitated by having them thus grouped. An organization remains at a center until its assignment has been determined or the establishment it is to operate is available for it.

Reserve units. A Medical Department Concentration Center also has a strategic feature in that the evacuation, surgical, and veterinary evacuation hospitals and the auxiliary surgical groups pertaining to the general headquarters reserve may be assembled and used as a pool under central control. Not only these units but other medical organizations that are normally components of a field army may be held and distributed to that army area where their services are most needed. A center also provides a place to which a unit, depleted in personnel and equipment by long operation at the front, may be withdrawn, overhauled, and rehabilitated. Without such a center the medical service would lack the elasticity necessary to utilize its replacements and reserves to best advantage in conserving the strength of the field forces.

Control. Medical Department Concentration Centers are controlled by the chief surgeon at general headquarters. As those headquarters are not usually concerned with the details of supply, administration, and operation, the direction exercised by the chief surgeon may be only the control of the assignment of units or replacements to such centers and their distribution therefrom. If such is the case, the local administration of the ac-

tivities of the center, i.e., training, supply, equipping, overhauling, and rehabilitation of the units, are supervised by the surgeon, communications zone.

MEDICAL SUPPLY

Introduction. The Medical Department is responsible for the supply of all medical material necessary for the health of the troops and for the care of the sick and wounded in the theatre of operations and in the zone of the interior. This responsibility involves provision for the care of animals as well as men. It includes all activities from the determination of supply requirements to the delivery of supplies to the individuals who use them. See Chapter VII, Part I, "Supply and Evacuation of Large Units."

Estimate of Requirements. Any plan for contemplated military operations must include a plan of supply for the theatre of operations. A plan suitable for one situation probably will not fit all situations. However, certain general principles have been adopted in order to insure the flow of supplies from the zone of the interior to front line troops. These fit into any general scheme of supply and are susceptible to comparatively little change in varying conditions of warfare. One of the phases of the supply plan is an estimate of the material required and the date and place at which it must be made available. Such is an important feature of every special war plan.

Factors. Some of the factors to consider in estimating medical supply requirements are:

The plan of operations.

Mission.

Size, organization, and equipment of the force.

Plan of concentration, rapidity, and location.

Time and dates of various phases of mobilization, concentration, and operations.

Rate of movement to the theatre.

Type and probable duration of operations.

Character of the theatre of operations.

Location adjacent to, or near, the zone of the interior or overseas.

Roads, railroads, and other means of transportation and lines of supply.

Resources which may be made available locally.

Construction required for lines of communication, i.e., hospitalization, and shelter required for medical supplies.

Climate and health conditions.

Population.

Characteristics of the enemy.

Military preparedness.

Military capacity.

Type of armament.

Probable movements and objectives.

Length, capacity, vulnerability, and type of lines of communication between zone of the interior and theatre of operations.

Medical supply plan in zone of the interior.

Plan of mobilization of resources.

Status of program for mass production, procurement, and storage.

Availability of supplies at various dates.

Medical estimate. An intelligent estimate of the medical material required cannot be made by the Surgeon General unless the above mentioned factors have been furnished and considered. A further necessity in making such an estimate is a list of items that constitute the medical material and the amount required under varying conditions.

The *medical supply catalogue* lists every item that is routinely issued by the Medical Department. It is apparent that there must appear therein every medical item that is contained in any equipment table.

An *equipment table*, based upon the supply catalogue, is provided for each type medical unit. Each table shows all of the medical equipment necessary for a unit to begin functioning. It is intended to include in each of these tables all equipment necessary for a unit to function, including that furnished by the Quartermaster Department and other supply agencies.

Renewal of supplies consumed are provided for in the supply catalogue, allowance tables, and other directives.

Initial, Maintenance, Reserve, and Automatic Supply. As the *impetus of supply is from the rear*, the Surgeon General in the zone of the interior is responsible for the procurement of medical supplies and their delivery to the theatre of operations. The Surgeon General, however, is influenced by the demand of the theatre of operations from time to time as to the general character and quantity of material required. The communications zone authorities are responsible for the utilization of local resources of the theatre, under policies established by general headquarters.

Classes. The requirements of medical supplies for a field force may be divided into three categories: initial equipment for troops and Medical Department units, material for maintenance, and that required to establish a reserve.

The material required as *initial equipment* of troops and Medical Department units, often termed organizational equipment or unit equipment, is covered as to quantity, type, and weight in equipment tables. Organizations entering the theatre of operations ordinarily are accompanied by this type of material. The equipment pertaining to many Medical Department organizations, e.g., general hospitals, is so bulky that it may not actually accompany the personnel. In all such cases, it is important that such equipment arrive in the theatre of operations simultaneously or before the arrival of the personnel which is to use it.

Maintenance supplies, to replace those consumed, are forwarded from the zone of the interior at the time field forces enter the theatre of operations or immediately thereafter. These supplies constitute the initial stock of the depots that are to be established in the theatre of operations. These depot stocks are maintained by a continuous flow of supplies from the zone of the interior. The kind and quantity of material needed to keep the command fully equipped and supplied for the duty upon which it is engaged is dependent upon factors that differ widely with each situation. The climate, health conditions, local resources of the theatre of operations, the nature of military operations, and the military characteristics of the enemy all have a bearing.

Reserve supplies are shipped to the theatre along with the maintenance supply until the desired reserve is established. The purpose of a reserve is to assure a source of supplies for the furtherance of military operations. The amount of reserves established is usually expressed in days, as 45 days' reserve. The size of this reserve is dependent upon many factors, some of which are:

The length, capacity, and vulnerability of the lines of communication between the zone of the interior and the theatre of operations.

The type of the operations and the armament and strength of the enemy.

The availability of local resources in the theatre of operations.

The probable duration of operations.

In the World War, the American Expeditionary Force planned to maintain a reserve of 90 days of medical supplies, although this amount was never accumulated except for a few individual items. When the submarine menace was overcome, the reserve contemplated was reduced to 45 days.

The *automatic supply* is based upon an estimate of the amount of medical supplies required to meet the daily needs of troops (maintenance) and that required to establish a reserve estimated on the basis of the amounts that experience has shown to be required for a fixed number of troops for a given time. The monthly consumption rate for a unit of 25,000 men is estimated for each item of supply, based on authorized allowances and experience. The quantity thus arrived at for each item is designated as the "automatic supply unit." The multiplier for the "automatic supply unit" is the number of troops in the theatre of operations divided by 25,000. Shipments of these units to the theatre of operations are continued at a designated rate until a change is requested.

The chief advantage of this method is that it makes available the supplies required by the forces with the minimum effort on their part. Its chief disadvantages are: the difficulty of accurately anticipating actual needs, the danger of flooding troops with supplies which they do not need and which they are not prepared to receive and care for, and a liability of failing to provide them with a sufficiency of some items which they actually

need. Its value is in direct ratio to the accuracy of the factors upon which it is based. The formulation of such factors must be made during peace; it cannot wait until the emergency has arisen. It is not to be expected that many factors formulated in peace will be such that they can remain unchanged in war. It is expected, however, that they will be such that procurement and distribution can be initiated satisfactorily. With some items, the predetermination of these factors is simple, fairly uniform, and well established. With others, it is not so simple; but, by using experience tables, they can be, and, in part at least, have been worked out on this basis. With still other items, greater difficulty is encountered. An automatic supply table permits the supply agencies within the zone of the interior to have a basis upon which to start original procurement, and the theatre of operations has initially the nearest to a rationally balanced stock that it is possible to provide by foresight. The difficulty is in maintenance of a stock that is balanced according to the needs that develop in the situation. However, the theatre of operations has the reserve as a reservoir from which to draw the items that may be required in excess. These items must then be requested from the zone of the interior in sufficient quantity to restore the balance of the reserve, and request must be made to so modify the constituents of further automatic units as to meet the demands that have been made evident. The term automatic supply, therefore, does not mean an inflexible predetermined supply. It is a method that requires constant supervision and adjustment to insure that it fully meets the demands of the situation. Its contemplated utilization makes it largely semi-automatic rather than purely automatic.

Exceptional supply. This includes special items and articles the need for which cannot be determined far in advance. The requirements for such are computed as the needs develop, and calls are made therefor in specified quantities.

Organization for Supply. The cardinal principles governing an efficient supply system are flexibility, elasticity, mobility, and simplicity. Large accumulation of supplies close in rear of combat troops tends to rigidity, rendering the system incapable of adjustment to changes in the situation. To provide against this and also to permit decentralized operation, the communications zone is often divided into sections: base, intermediate, and advance. The base section depots provide for receiving, classifying, assembling, and storing supplies received from the zone of the interior. The intermediate section depots keep a store of balanced stocks nearer the troops but far enough from the front to be safe from hostile interference. The advance section depots contain balanced stocks in quantities only sufficient to meet the immediate needs of troops in combat.

Modification. The organization and administration of the supply system in different theatres of operations will not usually be the same. The tendency is to assume a fully organized and multiple sectioned communications zone under all conditions or at least that a different organization would be unusual. The reverse will usually obtain. The communications zone will be built up from the simplest base even in major operations. In minor operations, the communications zone may be nothing more than a base. The situation may vary from a more or less elaborately organized communications zone to one sufficient only to establish contact with the zone of the interior, the resources and establishments of the latter being drawn upon directly for the maintenance of troops. If the theatre of operations is in the home territory or contiguous thereto, or if geographical conditions do not favor an elaborate organization along the lines described, it may be advisable to eliminate the intermediate section or altogether to omit the division of the communications zone into sections. In the latter case, the communications zone is organized as described for the advance section, and the classification and assembly of supplies are made in depots of the zone of the interior. Depending upon the distance of the theatre of operations from the zone of the interior, the size of the forces in the theatre of operations, the character of the operations, and availability of the communications net, supplies received from the zone of the interior are collected into depots of the communications zone or forwarded without transloading direct to railheads of the combatant troops. The latter condition obtains normally only at the beginning of operations in theatres contiguous to the home territory; the movement of supplies is then controlled by

regulating stations inserted in the communications net at or near the rear boundary of the theatre of operations.

Storage. Storage may be looked upon as an agency of distribution by which the movement of supplies is facilitated rather than as an agency for keeping supplies safe and in order. It would be ideal to keep supplies rolling from the point of origin to the place of consumption. However, it is always necessary to have reserves. By storage, reservoirs of supplies are maintained with which to meet uneven demands and irregular transportation facilities and with which to balance production with demand. Storage should be sufficient for this purpose and no more. The commander of the theatre of operations, in conjunction with the commander of the communications zone, decides on the location of all important supply installations and the amount and distribution of supplies. Storage space in the communications zone is allotted to the Medical Department by the commanding general, communications zone. This includes determination as to the location of depots as well as other supply establishments pertaining to the Medical Department. The surgeon, communications zone, keeps adequate record of all storage space allotted to the Medical Department, including its disposition and utilization. He makes application and recommendation to the commanding general, communications zone, for any additional storage space or depots that may be required from time to time by the Medical Department, in order to meet his responsibilities. The surgeon, communications zone, stores and maintains at the prescribed level the special supplies procured by it, such general supplies as are used exclusively by it, and such other general or special supplies used by medical troops as may be authorized by the commanding general.

Depot administration. Each general depot is commanded by an officer designated as "Commanding Officer," such and such "General Depot," etc. (See Chapter VII, Part I.) At each general depot in which medical supplies are stored, the Medical Department is represented by a Medical Department officer known as the *Depot Medical Supply Officer*. Each depot medical supply officer is responsible for:

The proper storage, care, maintenance, and issue of all supplies, equipment, and material pertaining to his branch, under such instructions as may be prescribed by the chief of his branch.

The control of the necessary technical personnel, military and civilian, to handle and record supplies pertaining to the Medical Department.

Supervision of the unloading and loading of supplies pertaining to the Medical Department, proper marking of all shipments and transmission of information in regard to shipments to consignees, through prescribed channels, in accordance with instructions issued from time to time by the surgeon, communications zone. Under no circumstances will a depot supply officer arrange for transportation except through the duly constituted transportation agencies under the supervision of the commanding officer of the depot.

Whenever any shortage of stock is indicated or anticipated in any article of supply, or the necessity arises for special control of expenditures or reduction of allowances, a depot medical supply officer will bring the matter at once to the attention of the communications zone surgeon, and the latter will take the necessary steps to relieve the shortage.

Depot supply officers communicate directly with the depot commander concerning matters pertaining to storage space. Correspondence pertaining to technical matters is directed to the surgeon, communications zone; all other correspondence is governed by orders and regulations on the subject issued from time to time.

Medical Depots. Location. Ordinarily, the existing facilities of a theatre of operations will be utilized for medical depots, as time may not permit the months of delay entailed by construction. Transportation may not permit the movement of construction material. Certainly the first depots established must utilize existing shelter. Buildings so selected must not only have suitable and sufficient storage space but also adequate transportation facilities. They should be located with railroad siding advantages on or immediately adjacent to a main railway line having good connections with both front and rear. Good motor road connections should also obtain.

Construction. When it becomes necessary to construct a medical depot, the following factors should be borne in mind:

The space should be laid out in separate areas for each class of supplies represented at the depot in the necessary proportion.

Each storehouse area is divided in sections, each section having a ladder rail track to each side connected by house tracks about 1700 feet long, there being one for each three warehouses. These tracks should be about 150 feet apart, giving space enough for open storage on the opposite side of the track from the houses and at the same providing a firebreak.

There should be no dead end in the track system except where particularly desired for unloading vehicles, so that railroad cars can be moved with the greatest facility.

Different types of storehouses should be distributed on separate tracks so that one particular commodity can be stored on separate tracks, as it is desirable for facility in receipt and distribution that the commodity be loaded on one track while it is being received on another.

Storehouses should be of such size as to involve the minimum amount of labor in handling stores. A 60-foot width and a length of 400 to 500 feet are considered the most economical from the standpoint of both operation and construction.

When time, labor, and material permit, which is seldom the case, operation is facilitated by placing the floor of the storehouse on a level with the floor of the average freight car. However, it will usually be necessary, due to dearth of material, to construct many storehouses without floors and to place drainage wherever required.

Storehouses (or open storage) from which shipments are made by truck, should be on a flank so as to avoid crossing railroad tracks and the delay usually caused thereby. These storehouses should be located as far as practicable on existing roads.

Storehouses should not be located so as to interfere with existing roads, as it takes more time to construct new roads than any other feature and the material for their construction is often difficult to obtain.

Receiving, classification, and departure yards are essential features of all large depots.

The building program must be carried out so that expansion is feasible and so that each unit is completed progressively and in succession in such a way that it can be used immediately. For example, it is wrong to start construction on a number of storehouses when only one house is needed at once, and it is wrong to lay ten railroad tracks in a yard before aligning and ballasting any, when perhaps only three tracks are needed immediately. The loss of efficiency due to using small units is insignificant compared to the importance of fulfilling the requirements of the military situation.

Storage space is usually expressed in terms of square feet of floor space. Storage space required for Medical Department supplies for a 45 day reserve may be estimated as 0.5 square feet (8-foot stack) per man in the forces. This amount will vary according to the amount of reserve and maintenance stores contemplated.

Echelonment of Medical Depots. The system of supply contemplates that medical units with troops shall normally be encumbered with the minimum of supplies, thus insuring a maximum of mobility. The agencies of distribution of medical supply in a large communications zone, completely organized, are echeloned from rear to front as follows:

Communications zone depots (medical section): base, intermediate, and advance.

The base depot or depots are established first. The others are established as the necessity for such becomes evident. The communications zone depots serve the entire theatre of operations and, therefore, stock all medical supplies (medical, dental, and veterinary) authorized for communications zone medical activities. The stock of advance depots may, however, be limited to that required by combat zone troops, the base or intermediate depots supplying the needs of fixed installations of the communications zone. If intermediate depots are established, they will usually contain the bulk of medical supplies within the theatre of operations.

Combat zone depots: One army medical depot serves each army, although it may be divided to operate in several places. The army medical depot serves all units of the field army. It either procures or stocks practically all medical, dental, and veterinary articles of medical supply that are authorized for the units of a field army. As field armies are mobile, the supplies maintained in army depots are ordinarily limited in character and amount to those essential to maintain combat efficiency for a period not exceeding three

days. The articles actually stocked by army medical depots are therefore those that require frequent replenishment. An army depot requisitions supplies through the army surgeon and regulating office, from a designated communications zone depot, and the supplies are received therefrom through the regulating officer. The depot issues direct to army establishments (evacuation hospitals, etc.) and issues to the headquarters and service companies of army, corps, and division medical regiments, who in turn issue to organizations served by them. Units drawing supplies from an army depot ordinarily send their own transport for them. Army medical depots must therefore be located on a railroad line leading from the rear and on good roads leading to the front. They are usually established near evacuation hospitals or in rear thereof at central points in the road net of the army service area.

A *corps medical park* is a temporary expedient utilized when a corps is acting independently. Ordinarily, it will be operated by the headquarters and service company (reinforced or otherwise) of the corps medical regiment. The supplies carried will usually be limited to the capacity of the available transport. When a corps is heavily reinforced and has a number of evacuation hospitals and surgical hospitals attached or is operating in an entirely independent campaign, the corps medical park may be operated by a portion of an army medical depot.

Medical supplies for a corps medical park are obtained through the army medical depot or obtained direct from a designated communications zone depot through the regulating station.

Medical supply sections of army and corps medical regiment headquarters and service companies serve their regiments and the regimental medical detachments with army and corps troops. The medical supply section of the headquarters and service company of a medical regiment, infantry division, serves the medical regiment and all of the units of the division. As these units are mobile and as transportation is always a controlling factor, the supplies carried consist of those items of field medical supplies authorized for these troops that are likely to require frequent replenishment. All medical supply sections ordinarily replenish their medical supplies from the army medical depot. Division medical supply sections in an independent corps obtain them from the corps medical park.

Regulating stations. The regulating station intervenes between the communications zone depots and the army medical depots. It is the agency in the system of supply distribution for the area or army it serves. As explained in the section on "Hospitalization and Evacuation," each regulating station has a medical group attached. This group is responsible for the systematic, orderly movement of the medical supplies to organizations served by the station and for the evacuation of men and animals therefrom. The group should be advised in ample time of proposed changes at the front that affect medical supply operations and make appropriate dispositions accordingly. They make suitable drafts for supplies on designated depots in rear to insure the necessary flow of supplies. Shipments are not forwarded to any regulating station, nor to any point in the zone of the armies served by such station, except by order of the regulating officer or in accordance with a definite shipping schedule previously approved by him. Officers commanding medical sections of depots and others in charge of shipments are responsible that advance notice is given the medical regulator of all shipments made to his regulating station. Medical supplies for an army are ordinarily sent by the regulating officer to the army medical depot in carload lots although less than carload lots are forwarded when necessary. The army medical depots then make all distributions within the army. This method is particularly desirable in combat where speed in supply is important. The rule is not inflexible, however. Supplies may be sent directly from communications zone depots to evacuation hospitals, convalescent hospitals, or other large units, located at railheads. Carload lot shipments may be thus expedited. Less than carload lot shipments are only sent in this manner when speed in supply is not of great importance, that is when troops are out of contact with the enemy or are in stabilized or semistabilized warfare. If this latter method is used, it is necessary that all such supplies be requisitioned through the army medical depots and the delivery acknowledged to the latter, even though the supplies do not pass physically through the army medical depots.

Medical Department Central Control. Successful supply coordination is dependent upon

a well organized supply section in the office of the surgeon of the communications zone, for upon this machinery rests the responsibility for the execution of all policies and plans for storage and distribution of medical supplies for the field force. The major portion of medical supplies will come by automatic shipment from the zone of the interior; there must, therefore, be on file in this office duplicates of all automatic schedules of supplies and equipment released from depots in the zone of the interior for shipment to the theatre of operations. Provision must be made for ready modification of the amount of the constituent items of the automatic supply unit in order to meet the changing needs of the forces in the theatre of operations. The supply division, Surgeon General's office, is entirely dependent for its information relative to the supply situation in the theatre of operations upon the data prepared by the surgeon, communications zone. There must, therefore, be established a close reciprocal liaison between these two agencies. The Army surgeon is entirely dependent for his replacement upon the depots of the communications zone. The supply division of the office of the surgeon, communications zone, must therefore have at all times an accurate knowledge of what is required by the armies, what is available in storage, and what supplies are in transit.

Medical supply reports. In the early development of communications zone activities, depots are established. These depots should send to the surgeon, communications zone, *periodical* and *special reports* covering the following:

<i>Stock</i>	Issued
	Remaining
<i>Space</i>	Utilized
	Available
<i>Car movement</i>	Into depot
	Out of depot

The information thus received is used as a basis for the office charts and graphs of the supply division. Data with reference to stock issues will be used in the study of usage factors and in connection with the modification of the automatic schedules referred to above. Consolidated stock balance reports serve as distribution sheets for the equalization of stock in depots. That is, issues or distribution of stock to depots are made in reports of expenditures.

All details of storage space within depots must be available for ready reference. This data should cover storage space authorized, provided, utilized, and vacant.

Distribution of Medical Supplies. The responsibility of the communications zone surgeon for the distribution of medical supplies extends from the base depots into the combat zone, but this responsibility ends with placing the supplies at the regulating station. Ultimate distribution within the combat zone is a responsibility of the Army surgeon.

Methods. Distribution is effected by two methods.

Distribution *on requisition* is the routine peace-time method and is also the old established method used in war and the one that is emphasized in *Field Service Regulations*. It is particularly applicable to small units, to front line troops, and to short lines of communication. Its chief advantage is that it is specific and, when successfully executed, results in the exact supplies required being received by the unit when needed. Its chief disadvantage is that, with the size and complexity of modern forces, the distance at which they may operate from their bases, and the rapidity of movement demanded, times does not suffice.

Distribution *by the establishment of credits* is a method utilized to cut the time and effort of requisition. This method makes definite quantities of supplies in storage available to the commands to which allotted. The latter call directly on the designated depot for their shipment. It is particularly applicable to the supply of larger units with items the need for which can be foreseen but for which the time or place of demand are indefinite. Time may be too short and space may be too great for the greatest efficiency, and the method requires supplies in such quantity that they can be earmarked and held available. Supply by this method is meeting with increasing favor where it is applicable.

Requisitions. The requisition method of obtaining supplies will generally be used for the distribution of medical supplies from the various depots to the units that are to use the

supplies. During combat operations, these requisitions will often be informal. Requests are normally filled from supplies actually on hand or at the disposition of the various headquarters. Only under exceptional circumstances will requests be forwarded for action to higher authority while subordinate agencies still have supplies at their disposal from which such requests may be filled. In such cases the reason for forwarding the requests to higher authority will be indicated. When a depot cannot supply all articles called for on a request it forwards such articles as may be available and notifies the surgeon, communications zone, by telegraph as to the unfilled portion of the requisition. The surgeon should direct another depot to forward direct to the requisitioner the supplies necessary to fill the requisition. The surgeon, communications zone, when authorized by the commanding general of that zone, may keep the entire stock of certain classes of articles of which the supply is limited at one or more designated depots; in such a case other depots will forward thereto their requests for these supplies.

In general, when it is known that items cannot be supplied within fifteen days after receipt of requisition by the supply agency concerned, they should be stricken from the request and the officer initiating the demand should be notified at once. *Arrearages* on requests are not allowed to accumulate. Prompt action on every request must be taken, within the limits of his power, by each officer through whom a requisition passes.

Organizations will not make duplicate requests for articles which they have called for on previous requests until they have received notice that such articles have been stricken from previous requests; provided, however, that:

Supply officers may at intervals of not less than fifteen days include in requests all items previously requested and not supplied, but they will indicate opposite each such item the number of times and the dates and reference numbers of the requests on which it has been previously stricken out. A reasonable period must be allowed for transmission of requirements and for delivery of supplies.

Within the combat zone during active operations, all medical units send their requisitions direct to the medical supply unit which normally supplies them. At other times they send them to their respective headquarters.

Credits. Specified quantities of medical supplies stored in depots in rear of the army may be allotted to and placed at the disposal of the army surgeon for a definite period of time. Such quantities of supplies are called "credits," and after allotment are subject to draft on demand direct from any headquarters without further reference to GHQ or the communications zone. The credit method of distribution is advantageous in supplying army medical depots during combat operations. The purpose of allotting such credits is to assure the army of a definite amount of medical supplies for the period stated and at the same time relieve the army of the necessity of caring for them in army medical depots. The commanding officers of the depots at which stores are actually located thus become warehousing agents for the army for the amount of medical supplies covered by the credit allotment. Upon receipt of drafts from army headquarters for supplies covered by "credits," the commanding officer of a depot arranges through the proper regulating officer for necessary transportation and causes cars to be loaded by the medical depot officer. One copy of each draft made against the credit will be sent by army G-4 to the regulating officer. By arrangement between army G-4 and the regulating officer, the orders may direct shipment in carload lots at a fixed rate for a number of days. At the end of the period named in the credit allotment, all undrawn balances revert to depot stock; but, on request made prior thereto, a new credit will have to be arranged by headquarters of the field forces (G-4) for the next succeeding period. The army surgeon may, at his discretion, make similar credit allotments of supplies in army medical depots to subordinate units and establishments.

Method of Supply within the Communications Zone. Medical units within the communications zone obtain their supplies in the following general manner, details of which are prescribed by the surgeon, communications zone.

All articles of ordinary medical supply needed by an establishment are issued by a previously designated supply depot on requests approved by local commanders and sent direct to the depot. Requests for exceptional supplies are submitted to the surgeon of the communications zone who, after approval, sends them to the proper depot for filling.

In authorizing credits and making drafts on depots for supply of medical units in the communications zone, the surgeon of the communications zone must use due care to protect the interest of the troops in the combat zone.

Copies of orders and general instructions in regard to medical supplies distributed by the surgeon of the communications zone should be forwarded to the headquarters communications zone to GHQ for information and file. It is a function of the chief surgeon at general headquarters to review such publications in order to insure that the general supply policies are maintained and that supplies are distributed in conformity with the strategic situation.

American Red Cross, Supply Function. The American Red Cross constitutes a part of the medical service in war. This is the only civilian relief organization authorized to procure and distribute medical supplies for use of the army. This procurement and distribution, whether at home or abroad, must be carefully coordinated with military needs if useless expenditure of money and needless duplication of effort are to be avoided.

"It is not intended that the Red Cross shall duplicate or parallel the work of the War Department in the procurement and distribution of medical supplies. Standard medical supplies procured by the Red Cross shall be held as a reserve to meet unforeseen emergencies or to supplement standard medical supplies in grave situations. Ordinarily, special or non-standard medical supplies furnished by the Red Cross should be turned over in bulk to the Surgeon General to be distributed by his agencies. The Red Cross may procure and issue certain nonstandard and less essential remedial supplies when the military situation permits, provided such supplies cannot be obtained through the usual channels." (Par. 9 b, AR 850-75.)

The supply activities of the Red Cross operating with a field force should be limited to supplying those items not furnished as standard supplies by the Medical Department, and distribution thereof should be controlled by the Medical Department. Red Cross supplies for a field force should be furnished upon a definite basis and in accordance with a well-balanced procurement plan which keeps pace with the progressive increases in strength of the force. This can only be accomplished as a result of a well-coordinated study of the needs carried out by supply representatives of the Medical Department and the American Red Cross. To assure this coordination within the theatre of operations, it is desirable that a Red Cross representative be assigned to the supply section of the office of the surgeon, communications zone.

SANITATION IN THE THEATRE OF OPERATIONS

Definition. The term military sanitation when used in its broadest sense includes all measures employed to prevent or control infectious diseases, and to conserve the health or to maintain or increase the physical fitness of military personnel. The procedures, measures, or activities included in military sanitation may be classified as environmental sanitation, epidemiology, physical examinations and physical inspections, and personal hygiene.

Medical Department Responsibility. Generally, the Medical Department is responsible to higher authority for investigating, reporting upon, and making recommendations pertaining to all phases of military sanitation. Specifically, the Medical Department is charged with the supervision, in an inspectorial and advisory capacity, of environmental sanitation, with the conduct of epidemiological investigations or studies, with the performance of all physical examinations and inspections, and with studying and making recommendations pertaining to measures which will protect or promote the physical fitness of the individual soldier.

Administrative Responsibility and Control. The administrative control of sanitation is exercised by organization commanders of all grades who are responsible for sanitation within their commands. Sanitary measures are executed by the personnel of the organization concerned or by special troops. Except in Medical Department organizations, Medical Department personnel does not execute sanitary measures, other than those involving professional activities, such as physical examinations, immunizations or the operation of laboratories.

Principal Factors in the Sanitation of a Theatre of Operations. The basic principles of sanitation in the theatre of operations are the same as those obtaining in the zone of the interior, but the methods employed in their application are modified by differences in the disease resisting characteristics of the personnel, by changes in environmental factors, by the nature of the military mission and operations, and by the facilities available.

During the mobilization and training period in the zone of the interior, the control of infectious diseases introduced by cases or carriers entering the army from civil life and the rejection or elimination of the physically unfit by means of physical examinations and inspections are of paramount importance and constitute the principal features of military sanitation. A newly mobilized military force possesses a relatively high degree of group susceptibility to infectious diseases but, on the other hand, effective environmental sanitation as a means of controlling the spread of these diseases can be more easily maintained in the zone of the interior than in the theatre of operations.

In a theatre of operations, the introduction of infection into a military force from outside sources is minimized by the absence of extensive or numerous contacts between the troops and a civilian population. Further, troops in a theatre of operations may normally be expected to be more resistant to infection, especially some of the respiratory diseases, than recently mobilized men. Epidemics in mobilization and training camps have served to increase the group immunity to certain diseases by increasing the number who have had these diseases or who have had repeated contacts with sources of infection. The resistance of the group to all diseases is further augmented by the physical training incident to military training and by the elimination of physical defectives. However, cases and carriers remain among the members of the forces and constitute sources of infection. Also, the more primitive environment in a theatre of operations, and frequently the character of military operations, render it more difficult to protect the troops from environmental sources of infection or to control or remove these environmental factors which serve to spread disease. Consequently, under the usual conditions, military sanitation in a theatre of operations is principally concerned with: *first*, the prevention of disease spreading from sources, such as cases or carriers within the military forces; and *second*, with environmental sanitation.

Plan of Sanitation for a Theatre of Operations. Any complete plan for military operations in a given theatre of operations includes provisions for protecting the health of the troops. A special war plan should, and usually does include a definite sanitation plan which provides for all sanitary measures of a general nature as well as for those special disease control procedures, the need for which can be anticipated. A plan of sanitation which forms a part of a special war plan is based on a study of health conditions existing in the theatre in question and of the character of the troops, with regard to the length of service and training, which will be sent to this particular theatre of operations.

As the factors of health significance vary greatly in importance in different theatres of operations, the special disease control procedures which may be provided for in different plans will likewise vary considerably. Thus, the season of the year, the nature of the diseases that are epidemic or endemic among the civilian populations in a particular theatre, or troop movements which will result in abnormal crowding may necessitate the formulation of plans for special procedures to control a particular disease or groups of diseases. In one theatre it may be expected that respiratory diseases will predominate while in another an insect borne disease may be the most prevalent.

Principal Features of Sanitation in a Theatre of Operations. Given a type theatre of operations, consisting of a communications zone divided into sections and a combat zone, the health problems presented in one portion of the theatre will differ to some extent from those encountered in another part of the same theatre.

Communications zone. The communications zone is primarily a zone of concentration and movement. If the zone is deep and troops must be transported for long distances by railroad, the crowding incident to troop movement in railway cars promotes the spread of diseases transmissible by contact and by lice.

The evacuation from the combat zone of those sick with communicable diseases together with the constant arrival of carriers and mild or early cases from the zone of the interior tends to concentrate sources of infection in the communications zone.

In the base section of the communications zone the health conditions are similar to those of the zone of the interior. Conditions are usually sufficiently stable to permit the execution of sanitary measures by agencies operating directly under the control of section headquarters, rather than by subordinate units. Thus, water supply systems of a permanent or semi-permanent character are usually installed and operated by the section engineers of the Engineer Corps. The operation of delousing facilities, waste disposal agencies or systems is a function of section headquarters or of organizations attached to those headquarters, and not of the individual units concentrated in or passing through the base section.

Diseases transmissible by indirect contact, especially the respiratory diseases, constitute the most serious health problem in the typical base section. Troops arriving from the zone of the interior bring with them carriers and cases of disease which serve as sources of infection. The carriers may be chronic or temporary carriers of such diseases as diphtheria or epidemic meningitis. Mild cases which have not been isolated, cases in the incubationary stage, or missed cases among troops who have recently arrived in the theatre of operations frequently constitute sources from which epidemic disease may spread.

The concentration of large numbers of troops in a base section, where housing facilities are frequently inadequate, will almost inevitably result in crowding. These conditions in the presence of sources of infection render it necessary that adequate measures be taken to control those diseases which are transmissible by indirect contact, such as the respiratory diseases.

In the advanced section of a communications zone, the health problems encountered differ from those of the base section only in that the environmental sanitation must to a greater extent be accomplished by the units concerned. As a rule, the incidence of intestinal diseases increases, due not only to a greater number of uncontrolled local agencies of transmission, particularly water supplies and food, but also to cases evacuated from the combat zone.

The combat zone. In the combat zone the control of communicable diseases is accomplished mainly by the early detection and evacuation of cases and carriers and by such control of transmission agencies as military operations will permit. Usually, the control of intestinal and insect-borne diseases present the greatest difficulty. The purification of the water supply, either by Engineer Corps agencies or by the using organizations, protection of the food supply from contamination, and delousing where louse-borne diseases are present, are usually the most important of the measures employed to prevent the transmission of disease among the troops in the combat zone.

Organization for Sanitation. *General headquarters.* The chief surgeon of a theatre of operations at GHQ formulates and recommends to the commanding general of the forces general policies pertaining to the prevention of disease and the conservation of health among the military personnel in the theatre of operations. If conditions are such that civilian populations are brought under military jurisdiction, the chief surgeon also prepares policies relative to such public health measures as may be required to protect the health of the civilian inhabitants.

In a typical theatre of operations, the chief surgeon does not directly supervise the execution of disease control measures. He is concerned only with general policies and delegates to the lower echelons all Medical Department activities pertaining to the supervision or prosecution of sanitary measures under such policies. He coordinates sanitation in the combat zone and the communications zone through the GHQ staff and by contact with the army surgeon, or surgeons, and the surgeon, communications zone.

The communications zone. The surgeon, communications zone, supervises and directs the sanitation of the communications zone. He has a medical inspector who, with his assistants, inspects and makes recommendations relative to all activities in the field of sanitation in the communications zone.

In situations where the communications zone is divided into sections, the surgeon of the communications zone may, and as a rule does, delegate to the surgeons of the various sections responsibility for the immediate supervision of sanitation within their respective sections. He continues, however, to exercise general supervision over and to be responsible to the commanding general, communications zone, in a staff capacity, for the sanitation of the entire zone.

The principal medical laboratory installations employed in the conduct of epidemiological studies and in the execution of disease control procedures are the general medical laboratory and the communications zone laboratories. Hospital center, general hospital, and station hospital laboratories, though primarily organized and equipped for clinical work, may also be employed in the conduct of analyses and studies connected with disease control, especially where such activities relate to commands served by these hospitals.

The combat zone. The army surgeon, or surgeons, if the combat zone is occupied by two or more armies, under the chief surgeon, GHQ, through the staff and commanding general of the army, supervises the sanitation of the combat zone. The army surgeon is directly concerned with all sanitation activities in the area occupied by the army. Corps and division surgeons are responsible for the supervision of sanitation within the commands to which they are assigned and the areas occupied by those commands in conformity with sanitary orders issued or policies promulgated by army headquarters through corps or division headquarters.

In a type army, sanitation of the army area is, to a large extent, supervised directly by army headquarters. To accomplish this function the army medical inspector and his assistants, under the army surgeon, make sanitary inspections, conduct epidemiology surveys or studies, or make such other investigations as may be required throughout the entire army area. They may also assist in or direct the health activities of the corps and divisions of the army, especially with regard to environmental sanitation.

The laboratory facilities which the army surgeon has at his disposal for employment in the conduct of health measures consist of the army laboratory and the dispensary laboratories of the medical regiments. The laboratories of the evacuation and surgical hospitals and the hospital companies of the medical regiments, like the hospital laboratories of the communications zone, are organized and equipped for clinical work. They may, however, under unusual conditions, or more particularly where the commands they serve are directly concerned, be utilized for the performance of epidemiological work.

Laboratories of the Theatre of Operations. The general medical laboratory and the army or communications zone laboratories are organized, staffed, and equipped primarily for the conduct of epidemiological studies and other laboratory functions pertaining to the control of communicable diseases.

The general medical laboratory. The general medical laboratory is a fixed installation in the communications zone and operates under the direct control of the surgeon of the communications zone. There is normally but one general medical laboratory in a typical theatre of operations. As far as practicable, it is established permanently where adequate facilities for extensive laboratory work are available and at a point which is centrally located from a service viewpoint. Its principal function is the general technical supervision of epidemiological work throughout the theatre of operations with a view to obtaining uniformity of methods and to establishing adequate control of disease. Specially trained individuals or groups may be sent from the General Medical Laboratory to various parts of the theatre of operations for the purpose of making epidemiological investigations or assisting in the control of some particularly difficult disease situation.

The General Medical Laboratory conducts research studies pertaining to disease control problems encountered in the theatre of operations. It distributes pertinent technical literature on disease control and laboratory methods. It may also supply, and, where necessary, manufacture biological products of a special nature.

Army or communications zone laboratories (T/O 8-234). (See Plate 5, Chapter IV.) The army or communications zone laboratories are classed as mobile installations. They are smaller than a general medical laboratory and can be more readily moved and re-established to meet the demands of changing military or disease situations. These laboratories are operated under the direct control of the surgeon, communications zone, or direct control may be delegated to a section surgeon. If in an army area, they may be under the control of the army surgeon.

An army or communications zone laboratory is primarily an epidemiological laboratory, and its principal functions are the investigation of epidemic conditions and the performance of routine laboratory analyses in connection with the control of communicable diseases.

Coordination of Sanitation Activities. The chain of responsibility for the technical supervision of all activities affecting the health of the troops in a theatre of operations passes from the chief surgeon at GHQ to the surgeon, communications zone, and from the chief surgeon to the army surgeons. If there are communications zone sections, each section surgeon is responsible to the surgeon of the communications zone. The division surgeons are responsible directly to the army surgeon. The corps surgeons are responsible to the army surgeon for those activities which concern the corps troops, but they do not normally supervise the sanitation of divisions belonging to their corps.

Administrative responsibility for sanitation coincides with command, and commanders of all grades are responsible to the commanders of the next higher echelon for sanitation within their commands, except that division commanders are normally responsible to the army commanders rather than to the corps commander.

Military sanitation is accomplished by administrative action by the proper military authority, which is in turn based on the technical advice and recommendation of the surgeon of the command concerned. The surgeon of a command discharges his responsibility for the technical supervision of sanitation principally by recommendations to his commanding officer. These recommendations are based on the results of inspections or studies made by the surgeon or by such of his subordinates as the medical inspector, laboratory personnel, or the surgeons of subordinate commands.

Administrative action is obtained by the issue of orders or instructions by the proper military headquarters. In the case of the smaller units, such as a division or a fixed installation, all routine sanitation matters are usually provided for by a sanitary order issued by the commanding officer. The commander of such a unit, or his representative, may provide for special sanitary measures by special or administrative orders, circulars, or memoranda of instructions or by informal verbal or written instructions.

In the higher echelons, such as the communications zone, sections of a communications zone, or an army, action with regard to sanitation is normally controlled by means of circulars, bulletins, letters, or memoranda of instructions issued to the lower echelons of the command concerned.

CHAPTER VI

TRAINING OF MEDICAL UNITS

Aside from actual battle or service functions, the training of the units of the Medical Department, individually and collectively, is the most important of all activities. This is true not only for such organizations as medical regiments, medical battalions, and regimental medical detachments attached to subordinate units of the arms and services, but also for all medical establishments extending from the combat zone back into the zone of the interior. Whatever the special function of the unit may be, its efficiency and the efficiency of its component elements will depend largely on the character and thoroughness of its training.

Military training is intended to develop in the individual and in the unit the following qualities: military discipline; health, strength, and endurance; morale; initiative and adaptability; leadership; teamwork; technical proficiency; tactical proficiency. (TR 10-5).

Training Management and Control. Training management includes the planning, organizing, and conduct of training of any unit, large or small. It brings within its scope the utilization of all personnel, time, material, and facilities necessary to secure the most effective and efficient training of the unit. (See Plate 1.) It is a function of command.

Each commanding officer is directly responsible for the training and efficiency of his own unit. Since he is held responsible for the training he must control the means whereby the training is to be carried out, in brief, the time, personnel, and facilities required to attain the training objective. Effective training management contemplates the exercise of judgment and common sense in the assignment of officers as instructors, looking carefully to their command and training abilities. A good ward surgeon may not be qualified to act as detachment or company commander. The full development of the all-around officer is brought about by giving the young officer varied duty assignments.

The noncommissioned officers are a very important factor in training management. They act as instructors in certain subjects and as assistant instructors in others. The noncommissioned officer who has a keen interest in his unit, and who is qualified for his important position in the organization, plays a very important role in training.

Distribution of Training Duties. Each instructor should be utilized according to his special qualifications, and the distribution of training duties should be made accordingly. Only a part of the instruction can be carried out by the commanding officer in person; the remainder must be done by subordinates. The commander retains supervision over all training. He assists, coordinates, observes closely, and when necessary corrects the errors; still, he gives a certain independence to officers and noncommissioned officers in their training duties. Corrective action is given in private to the officer or noncommissioned officer concerned.

General Principles Governing Training. In the conduct of training responsible officers should be guided by the following general principles:

Just but exacting discipline.

All instructors, commissioned and enlisted, must be fully qualified to train troops in the subjects assigned to them, including a practical knowledge of correct and effective methods of training.

The training must be progressive, proceeding step by step, and must have a definite, easily understood objective.

That each noncommissioned officer is directly responsible to his next superior for the conduct, discipline, and efficiency of his squad, section, platoon, or working group.

That the thoroughness and completeness of the training must be such as to insure efficiency of the Medical Department units serving within infantry and cavalry divisions. This includes knowledge of the means and agencies of communication available to them during combat.

That each group must attain a high degree of individual skill in each special and technical battle function.

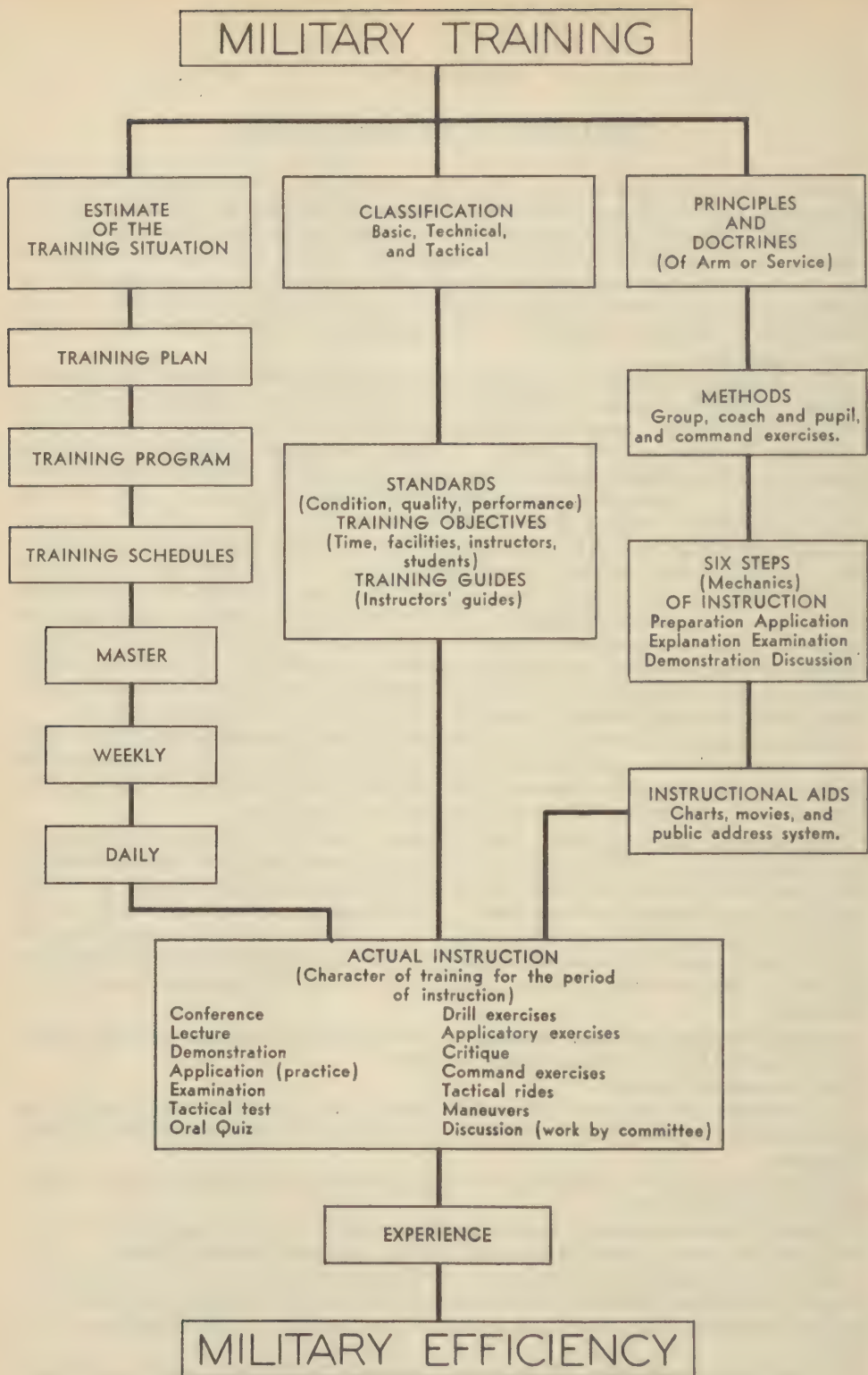


Plate 1. Fundamentals of Military Training (Schematic Diagram).

That all individual training in a Medical Department unit is preparatory to actual service; that the ultimate training objective in every organization is the highly coordinated teamwork of all the elements of the unit for its special functions in peace and war.

That the following keys to successful training be properly studied, understood, and applied throughout the training program: knowledge, leadership, discipline, a clear conception of the training situation, correct organization, zeal and professional preparation, simplicity, thoroughness, correct training objectives, correct methods of training.

Classification of Training. Military training is divided into: Basic Military Training, Technical Training, and Tactical Training. See detailed mobilization training program below for subjects allotted to this classification. These three phases of training cannot be so sharply separated that one of them is entirely finished before the next is taken up. However, the order in which they are stated above is the logical order of development of training in any organization.

Basic Military Training. Basic military training is the primary training given to all recruits. The instruction is designed to make him a useful, dependable member of his organization; to adapt him to the special conditions of his new environment so that he may live as a frictionless unit in his organization; and to enable him to take care of himself and his equipment in field or garrison service.

General Order No. 7, War Department, 1927, prescribes the basic disciplinary training for the enlisted personnel of the Medical Department, as follows:

"Basic military training is required for all recruits immediately upon their entrance into service. The responsibility for such training is placed upon the immediate commanding officer of each recruit."

Basic military training for enlisted men consists of proficiency in the following subjects:

Knowledge of Articles of War, local orders, and Army Regulations pertaining to enlisted men (MCM; AR 600-355 and 615-290.)

Military courtesy and customs of the service (FM 21-50).

Uniform regulations (AR 600-40).

Physical training (FM 21-20).

Personal hygiene, first aid, and sanitation (FM 21-10).

Care of quarters (AR 210-70, FM 21-10; TM 8-255).

Instruction of the soldier, dismounted without arms (FM 22-5).

Squad drill (Close order) (FM 22-5).

Care and use of personal equipment (FM 21-10).

Interior guard duty (FM 26-5).

Tent pitching (FM 21-15).

Defense against chemical warfare (FM 21-40).

Individual defense against air and mechanized attack (FM 100-5; Tr. Circular No.

3, War Dept., Sept. 23, 1940).

The training of recruits in basic military subjects will begin immediately after enlistment and will continue until reasonable proficiency is attained. The time required to accomplish such proficiency will be dependent upon local conditions. This training is regarded as purely military training, and as such it should be conducted concurrently with special instruction and performance of technical duties pertaining to the service to which the recruit is assigned.

The facilities for the training of recruits will necessarily vary according to the number and character of agencies for such training at the disposal of the immediate commander. Upon arrival of the recruit at the station of the organization to which assigned, the immediate commanding officer is held responsible for providing promptly the necessary means for such training.

In cases where recruits are delayed in becoming identified with the unit to which they are to be assigned, either on account of retention at the recruit depot, awaiting assignment, or for other cause, the immediate commanding officer will commence the training of such recruits and continue such training until relieved of the responsibility. (Sec. IV, G.O. 7, W.D., 1927.)

Technical Training. The technical training of personnel includes all the special training

and instruction required for its administration and to enable it to perform skillfully the functions for which it is organized.

It includes the training of clerks, chauffeurs, and cooks; dental, laboratory, medical, sanitary, and surgical technicians; auto-mechanics, nurses, and ward masters; individual elementary instruction in anatomy, physiology, and the administration of drugs in the care of men and animals. Mounted organizations, such as the veterinary company and the animal-drawn ambulance company, must have trained horseshoers, saddlers, and wheelwrights.

In addition it includes the technical instruction required by each organization to enable it to further function efficiently in its proper capacity in all situations (organizational training). Included in this phase of technical training are litter drills, heavy tentage drills, nomenclature and use of equipment, packing of equipment, loading and unloading of vehicles, training in communication, training litter bearer platoons in field sanitation, map reading, and sketching; and, in the medical regiment and the regimental medical detachments attached to combat units, the technique of the establishment and operation of their several stations in combat.

Tactical Training. Tactical training is that training required to enable the medical unit to so maneuver and dispose of its several elements in combat, utilizing them as a coordinated whole, that it may perform efficiently its battle functions. The tactical training of the unit includes the study of all factors which determine the movement and location of its elements in combat. This training is based upon the tactical disposition and employment of the arm or arms to be served.

Methods of Training. The methods of training are the tools in the hand of the instructor. Good methods of training are like instruments of precision; that is, in skilled hands they produce excellent results, while in incapable or indifferent hands, harm may be done.

In all military training thoroughness and not speed is of first importance. Training objectives should be reached, not by rapidly given superficial instructions, but by a progressive mastery of the subject by applying intelligence and resourcefulness to the selection of the method of training to be used, adherence to the steps of instruction, and to the intelligent use of means (instructional aids) to arouse and hold the attention and interest of those undergoing instruction.

In the military there are three commonly used methods of training; group method, coach-and-pupil method, and cadence drill (command exercises). Of these the group method and the command exercises are more applicable to instructing large numbers of men without the need of many instructors.

Group method. This method of training may be used in the instruction of any group, regardless of size or organization. It centralizes control under a single instructor who may have one or more assistants and demonstrators. It is well adapted to instruction by explanation, demonstration, or application in basic military subjects. In using this method the size and arrangement of the group undergoing instruction must be such that every member of the group is able to see and hear the instructor. A preferred arrangement for many subjects when the demonstration step is predominant is a "V" formation of the student with the instructor and demonstrators in the opening of the "V". A square, circle, or open box formation may be used, the instructor and assistants taking their place in the center of the formation. For lecture or conference all students should be able to hear and see the speaker.

The coach-and-pupil method. This is a method of training in which individuals are paired off, and, acting alternately as coach and pupil, instruct one another after a manner previously explained and demonstrated to both by a competent instructor. This method logically follows the group method. It should never be used as an introductory method of training. Properly supervised and applied this method is useful in the development of potential instructors. It teaches the individual to think as well as to act, stimulates his powers of observation, increases his alertness, teaches him how to give commands, and add to his individual value by giving him a more detailed knowledge of training matters.

The procedure of application for instruction in drill is as follows: Groups are formed in double rank, ranks facing each other and separated by a few paces. Ranks are extended laterally until adjoining men can just touch finger tips. The instructor then designates all files of one rank as coaches and all files of the other rank as pupils. The instructor then

describes clearly the subject in which instruction is to be given and demonstrates it slowly and with precision. He now gives the group an opportunity to ask questions. The coaches are directed to proceed with the instruction. Each coach then has his pupil execute the work or movement while he endeavors to detect and correct all errors. The instructor regulates the progress of the instruction and corrects errors made by the coaches. After a short period of instruction the relation of the two ranks are reversed, the pupils now becoming the coaches and the coaches the pupils. Coaches stand at attention while giving instruction, and the pupils are "At ease", or "Parade rest".

This method of training is applicable to many subjects of basic and technical training. It should be remembered that long, complicated explanations and demonstrations represent a misapplication of this method.

Cadence drill. To facilitate instruction and to insure exactness in the execution of close order drill and exercises for physical development, there has been developed a method of training called the "cadence drill" or "command exercises", which causes the men in ranks or groups to give aloud and in unison the necessary commands and counts for the various movements. Its field of usefulness is limited to instruction in close order drill and exercises for physical development, where, if properly used, it constitutes a valuable aid. It emphasizes the essential parts of the movement by breaking it up into steps, insures exactness of execution, makes the men feel that the whole operation is essentially theirs, serves to increase their sense of responsibility, and stimulates their interest and enthusiasm. It affords every man an opportunity to develop confidence and ability, the former through hearing his own voice, the latter through learning how to enunciate and time his commands properly.

The mechanics of the cadence method as applied to instruction in drill are as follows:

The unit being in line, it is desired to have it execute a "Right Face". The instructor announces: "Face the platoon to the right", or "The platoon will execute Right Face", and then "COMMAND". At the word "Command" each soldier calls out "1. Right, 2. FACE, ONE, TWO" and executes the movement. This method may be applied to many movements of drill. When the cadence method is used to count cadence during physical exercises or while marching at drill the command "1. In cadence, 2. COUNT" is used. Each soldier counts aloud and sharply "1, 2, 3, 4, 1, 2, 3, 4", beginning with the left foot as it strikes the ground after the command "COUNT". The odd numbers are repeated as the left foot strikes the ground, the even as the right foot strikes the ground. Only two sets of four are counted after the command of execution.

The Mechanism or Steps of Instruction (TR 10-5). "Effective instruction in any subject, whether in the class room or on the training ground, requires six steps or phases, which should be understood and applied to all training". This mechanism is applied regardless of the method of training used. The steps or phases are as follows:

1st step: preparation. The preparation of the instructor includes in addition to a knowledge of the subject a thorough estimate of his class and of the conditions under which the instruction is to be given, his training objective, and a careful consideration of the methods of training, steps of instruction, and instructional aids best adapted to the conveying of his knowledge to the student. This step therefore includes a plan of the mode of presentation of the subject in the time allotted.

2d step: explanation. This step consists of explaining or telling (lecture or conference) the men undergoing instruction what is to be done. Here they learn by listening. The presentation includes many factors, all of which must be duly considered and most of which involve the personality of the instructor: voice, physique, neatness, thoroughness, humor, dramatic ability, resourcefulness, alertness, cordiality, patience, sympathy, sincerity, enthusiasm. The instructor should endeavor to center the attention and interest of his class on his subject rather than on himself. He should develop the factors of a good personality but if he fails in all others and gains sincerity, sympathy, and enthusiasm, his instruction will be effective. He should be natural, preserve his individuality, and avoid interest-diverting mannerisms. A good instructor makes a difficult subject seem simple.

3d step: demonstration. This step consists of showing the men undergoing instruction what is to be done. Here they learn by seeing. Instructional aids, such as charts and

illustrations, moving pictures, and slides, add much value to the instructional process when properly prepared and skillfully presented. Demonstration forms a distinct step in all methods of applicatory training.

All demonstrations are based on the principle that visualizing an object or procedure makes a lasting impression on the mind. They are of value only to the degree in which they accurately exhibit the subject or procedure under consideration. When well planned and executed, demonstration by trained personnel forms one of the most effective steps in presenting instruction in basic, technical, and tactical subjects.



Plate 2. Demonstration of the Battalion Medical Section.

In preparing for a demonstration the subjects must be studied from all angles and the entire demonstration must be worked out in detail before rehearsals are attempted. Decisions must be made as to exactly what is to be demonstrated, what phases are to be emphasized, what facilities are available, the personnel and equipment necessary and the exact time and place of the finished demonstration and of the rehearsals. A helpful memorandum for arranging a demonstration is as follows.

The purpose of the demonstration.

Text references applicable to the subject being demonstrated.

Preparation needed for the demonstration:

- Troops or other personnel required.
- Uniform and equipment for troops.
- Demonstration equipment.
- Instructor's equipment.
- Place where demonstration is to be held.
- Maps if any are required.
- Arrangements for rehearsals.

Procedure to be followed:

- Arranged in detail, step by step, and in proper sequence.

In basic military training it will be found that demonstrations can be used to advantage in teaching the following subjects.

- Drill, the soldier dismounted.
- Drill, the squad.
- Assembly and display, individual equipment.
- Pitching shelter tents.
- Individual cooking.

First aid and bandaging.

Military courtesies.

Physical training.

In technical training most subjects can be taught by demonstration with profit and with a great saving of time.

Tactical training is organization or group training. Phases of this training may be taught by demonstration, especially for the benefit of officers and noncommissioned officer.

4th step: application. Application is practice by individuals to acquire skill in execution of the subject previously explained and demonstrated. Competition between individuals



Plate 3. Demonstration Litter Drill.

Left: Formation for Litter Drill.

Right: Litter Posts.



Plate 4. Demonstration Ambulance Loading.

Upper left: Preparing the Ambulance for Loading.

Lower left: Loading the Ambulance.

Upper right: At Litter Posts.

Lower right: Closing the Ambulance.

and groups of individuals is a valuable aid during this phase of instruction as it stimulates interest and enthusiasm.

5th step: examination. Examination is a step of instruction to test and determine the progress or proficiency of individuals. Examination should bring out and tie together the essential points so as to leave the student with a larger and better impression of the subject as a whole. Advantage should be taken by the instructor of the psychological conditions usually existing at the time of examinations or inspections to engrave deeply upon the mind of the soldier (student) the fundamentals of his subject.

6th step: discussion. The purpose of this step is to sum up the important features of instruction developed in the above steps; to point out correct and incorrect methods of execution in each case and to make uniform the general understanding of the subject. The discussion usually takes the form of a conference; when held at the close of applicatory exercises it is referred to as a "critique."

TRAINING PLANS, PROGRAMS, AND SCHEDULES

The first step in the planning of training is the estimate of the training situation; the second step is the preparation and promulgation of definite plans for the carrying out of the decisions arrived at as a result of the estimate. These plans result in the development of the training program or training schedules.

Training Programs. There is no prescribed form for training programs. Every officer who prepares such a document must be guided by the training project for which the program is provided. Completeness, logical sequence, and clarity are the essential features of a good training program. The following form is suggested as a guide:

Place and date of issue with introductory remarks.

Mission.

Scope of course (in time or periods giving general character as Basic, Technical, or Tactical; armory training; field training).

Allotment of time (weekly and daily).

Part of day to be utilized for training.

Plans for coordination of training and administrative duties.

Distribution of training duties.

Master schedules and schedules (instructions for the preparation of programs and schedules by subordinate commanders).

Methods of training (instructions covering the conduct of training and the steps of instruction to be employed).

Training objectives (state of proficiency to be attained).

Inspections (unit inspections).

Recruits (specific instruction as to where basic training will be given).

Training facilities.

Program of instruction (Subjects to be taught and sequence of their presentation).

Schools (kinds, conduct of, attendance, instructors, and coordination with other training).

Training guides.

Inspection calendar (for training inspection).

Date when training program becomes effective.

Office of the Surgeon,
Fort Meade, Md.
20 September, 194—.

TRAINING PROGRAM NO. —.

The following regulations governing the training of this medical detachment during the period, October 1, 194— May 31, 194—, are published for the information and guidance of all concerned.

S/ Jonas H. Hanson
JONAS H. HANSON
Major, Medical Corps.

Distribution:

- 1 copy to ea officer
- 1 copy to ea noncommissioned officer
- 2 copies file
- 3 copies Post Hq
- 1 copy CA Surgeon

1. MISSION.—The training mission for this detachment during the period covered by this program is:

a. To so thoroughly prepare its members individually in the basic military training subjects prescribed in Section IV, G.O. 7, W.D. 1927, that each individual will compare favorably with the best organizations in this garrison at all times and in all situations.

b. To thoroughly train the detachment in all of its technical duties as a hospital detachment and for the technical duties of a medical detachment with an artillery regiment and a cavalry squadron in camp, on the march, and during combat.

c. The tactical training of an artillery regimental medical detachment and a cavalry squadron medical section so that it will be fully qualified by May 31st to participate with efficiency and credit to itself in the field training of the artillery and cavalry during the month of September 194.—

d. To develop its officers and noncommissioned officers as leaders and instructors.

2. SCOPE.

a. This program covers eight months' training in combination with the detachment's routine garrison duties—a total of about 418 hours' scheduled instruction. The training will be progressive and will include successively the basic military training of the detachment, the qualification of the detachment in all of its technical duties, and finally its preliminary tactical training in preparation for the combined field training with the 9th FA and the 16th Cavalry during September next.

b. An Officers and Noncommissioned Officers School will be conducted throughout this training period as prescribed in paragraph 15.

3. WEEKLY AND DAILY ALLOTMENT OF TIME.

a. From October 1 to December 23 (incl), a training week will consist of 16 hours. From January 3d to May 31st, a training week will consist of 11 hours.

b. The training day for unit training until December 23d (incl) will be from 1 PM to 4 PM Mondays, Tuesdays, Wednesdays, Thursdays and Fridays and 10 AM to 11 AM, Saturdays; January 3d to May 31st, 1 PM to 3 PM, and on Saturdays, 10 AM to 11 AM.

c. Officers and Noncommissioned Officers Schools, 5 hours weekly until December 23d, and thereafter 4 hours weekly.

d. Unit and hospital inspections not included in the allotment of time to training.

4. METHODS OF TRAINING.

a. Instruction by application when practicable will be employed. In general, the procedure for each subject in which instruction is being given is *explanation, demonstration and application*. The following methods of the applicatory training will be employed wherever applicable.

(1) Group Method

(2) Coach and Pupil (to immediately follow group method)

(3) Cadence Drill—for squad and platoon drill (to follow coach and pupil method)

b. In technical instruction *carefully prepared* demonstrations are to be used to the fullest extent. They must be followed by application. Training in the use of equipment is carried out best by the group method with an instructor and demonstrator for each group. In classes, blackboard drawings and quizzing are to be freely employed.

c. Great care will be exercised:

(1) To see that instruction is so given that the soldier participates in his own training, actively.

(2) To remember that it is necessary to secure and hold the soldier's interest.

(3) To show visibly to the whole detachment the progress that it is making by passing directly to the next subject or the next phase of the same subject when the unit has been found to be qualified as determined by the training inspection in that subject.

5. CONDUCT OF TRAINING.

a. Inclement weather will not be permitted to interfere with carrying out the provisions of this training program. The weekly schedules will provide suitable substitutes for out-of-door training when that training cannot be transferred indoors.

b. As instruction progresses the technical and tactical training of the detachment will be given progressively increased attention, but at no time during the period covered by this training program will disciplinary drills be discontinued.

c. Officers and noncommissioned officers will be required to prepare themselves thoroughly for carrying out all training assigned to them.

d. The requirements of military courtesies will be at all times carefully observed. This applies not only to those occasions when the detachment comes in contact with other units of this garrison outside of the hospital but particularly at all times within the hospital.

6. SCHEDULES.—The weekly schedules for the following week's training for the Detachment, the Officers School, and the Noncommissioned Officers School will be published each Friday by the Surgeon.

7. TRAINING STANDARDS AND OBJECTIVES.

a. Training standards for individual subjects and training objectives for the groups to be designated as nuclei for the 29th FA and the 16th Cav. are prescribed in the accompanying training guides Nos. 1 to 32.

b. Instructors will be held responsible for attaining the prescribed standards in their classes in each subject within the allotted number of hours.

c. Officers assigned to the artillery and cavalry group, respectively, will be held responsible for reaching the prescribed standards for their groups by May 31st.

d. In general, each enlisted man is to be so trained (key men are being trained) that he is thoroughly proficient in at least two positions in a combatant unit medical detachment, e. g., trained litter bearer on

terrain exposed to hostile fire and trained to do a certain type of duty in an aid station during combat. The above is in addition to his special training for garrison hospital duties.

8. TRAINING INSPECTIONS.

a. The date on which the surgeon expects the desired degree of proficiency in each subject is shown in the inspection calendar, paragraph 16.

b. Individuals or groups failing to qualify in the training inspection of any subject will be required to make up the deficiency during hours prescribed by the surgeon.

c. Training inspections will not be made in any subject prior to the date specified in the inspection calendar.

d. All officers and noncommissioned officers will exercise at all times their important inspecting duty of supervision.

9. UNIT INSPECTIONS.

a. A unit inspection will be held each Saturday at 8:30 AM. Each enlisted man will be inspected in formation every other Saturday. These inspections will routinely include individual equipment, hospital, and quarters.

b. No officers are excused from these inspections.

10. DISTRIBUTION OF TRAINING DUTIES.

a. The surgeon will supervise and coordinate all training. He will personally conduct training as shown in paragraphs 12 to 14.

b. From October 1 to April 30, the detachment will be trained as a unit. From May 1 to 31, the training will be principally by section, one FA medical detachment section and one cavalry medical section.

c. The Officers School will be conducted by the Surgeon except in such subjects as are taken in the garrison school.

d. The Noncommissioned Officers School will be conducted by Captain Rowland H. Smith, M.C., under the supervision of the Surgeon.

e. Assignment of noncommissioned instructors will be published prior to October 1st.

f. Other instructor assignments as shown in paragraphs 12 to 14.

11. ATTENDANCE.

a. The following enlisted personnel will routinely be excused from scheduled detachment inspection:

- | | |
|--|--|
| (1) The noncommissioned officer in charge of quarters. | (4) One man for all wards. |
| (2) One cook and one kitchen police. | (5) Personnel on regular night duty. |
| (3) One dispensary attendant. | (6) Illiterates attending the post school. |

b. No others will be excused except for valid reasons and then only on approval of the Surgeon in each case.

12. BASIC MILITARY TRAINING.—A thorough review of the subjects of basic military training as required by Section IV, G.O. 7, W.D. 1927, will be carried out between October 1 and November 30—approximately 134 hours. (Entire detachment).

Subject	Approximate No. Hours Allotted	Conducted by	Place	Text References
Physical Exercises	20	Lt Inwood M O	Field and Ward 6	Omitted
Army Regs affecting Enl Men; Rights and obligations of the soldier; post regulations	4	The Surgeon	Room 11	
Articles of War	2	The Surgeon	Room 11	
Military Courtesies and Customs of the Service	10	The Surgeon Lt Inwood	Ward 6, Field, and Room 11	
Care of Quarters	12	Lt Inwood	Room 11 and Qtrs	
The Soldier Dismounted	12	Capt Smith	Field	
The Squad, Close Order	18	Lt Inwood	Field	
The Platoon, Close Order	8	Lt Inwood	Field	
Care, making up, and use of personal equipment	8	Capt Smith	Field and Bks	
Shelter Tent Drill	6	Capt Smith	Field	
March technique, march discipline, establishing camp, camp expedients	20	Capt Smith	Road and bivouac sites	
Gas Defense	6	The Surgeon	Room 11 and Post gas chambers	
Interior Guard Duty	8	Capt Smith	Room 11 and Field	

Total

134

13. TECHNICAL TRAINING.—A painstaking course in the technical subjects in which this detachment must be proficient, will be conducted from December 1 to March 31, 194—. Approximately 180 hours of instruction. Entire detachment. Scheduled instruction will be suspended from December 24 to January 2, incl. Composition of classes and instructors for the several classes of technicians will be announced in February.

Subject	Approximate No. Hours Allotted	Conducted by	Place	Text References
Tent pitching, small wall and pyramidal	6	Lt Inwood	Field	Omitted
Litter drill and ambulance loading	10	Capt Smith	Field and Ward 6	
Elementary anatomy and physiology	12	The Surgeon	Room 19	
First Aid, bandaging and splinting, and treatment of gas casualties	18	Capt Smith	Ward 6	
Field sanitation and sanitary devices	6	The Surgeon		
Training technicians, clerks, stock clerks, cooks, and medical, surgical, and laboratory technicians and drivers, each	50	All officers		
Equitation and care of animals	45	Offr detailed by Post Comdr	Field and riding ring	
Callisthenics	18	Jr offr in wkly rotation	Field and Ward 6	
Squad and Platoon Drill	15	Lt Inwood	Field and Ward 6	
Total		180		

14. **TACTICAL TRAINING AND MEDICAL SERVICE WITH LIGHT ARTILLERY AND CAVALRY.**—A systematic course of instruction will be conducted from April 1 to May 31 on the organization, equipment, functions, and operation of the medical detachments of light artillery and cavalry regiments in the field. During the month of April, the detachment will receive this training as a unit. During the month of May, the detachment will be divided for training purposes into two sections, that for the 16th Cavalry being one-half the size of that designated for the 29th F.A. During May, the training will be largely field training by section. For certain exercises on the ground the sections will be combined in order to more nearly approximate a war strength detachment for artillery or cavalry regiments. In both sections individuals will be trained as key men for the mobilization nuclei. The field exercises will be carried out with the detachment mounted and with complete individual and organization equipment and transportation. The assignment of personnel, commissioned and enlisted, to each of these sections will be announced prior to March 31st.

Subject	Approximate No. Hours Allotted	Conducted by	Place	Text References
Physical Exercises	8	Capt Smith Lt Inwood	Ward 6 and Field	Omitted
The organization, armament, and operation of the artillery and cavalry regiments	4	Surgeon (or offrs designated by Post Commander.)	Room 11	
Squad and Platoon Drill	8	Lt Inwood	Field	
The organization, functions, and operation of the med dets with the cavalry and light arty regiment	6	The Surgeon	Room 11	
The equipment and material of the med dets of FA and Cav—nomenclature, uses, care of	6	Capt Smith Lt Inwood	Storeroom; Field	
Duties of the med det in camp and the establishment and operation of bn and regtl dispensaries	5	Capt Smith Lt Inwood	Field	
Duties and operation of the med det with cav and arty on the march. Standing Operating Procedures	2	Capt Smith Lt Inwood	Field	
Technique of the estab and operation of aid stations during combat	8	Capt Smith Lt Inwood	Field	
Communications available to the med det with arty and cav (Technique and application)	8	Capt Smith Lt Inwood	Classroom and Field	
Combat Principles and Practice:—Troop and btry aid squads; litter bearer squad; aid sta. squad. Communications: Teamwork, contact with unit, relief, defensive and offensive situations. Day and night operations. Preparation of shelter from shell fire for wounded	39	Capt Smith Lt Inwood	Progressive exercises on the ground itself	
Total	94			

15. SCHOOLS.

a. Officers School.

Conducted by: The Surgeon (certain subjects taken in unit schools of the Cavalry and Artillery).

From: October 1 to March 31.

Time allotted: 5 hours weekly to Dec. 23d; thereafter, 4 hours weekly.

Attended by: All officers.

Subjects: Principles and Methods of Training; detachment and hospital administration and supply; the organization and employment of the infantry division (general); the organization, armament, and employment of the cavalry and field artillery regiments; the medical service of the combat zone; combat orders; topography; operation of the medical detachments of Field Artillery and Cavalry.

b. School for Noncommissioned Officers.

Conducted by: Capt. Rowland H. Smith, M.C.

From: October 1 to March 31.

Time allotted: 5 hours weekly to Dec. 23d; thereafter, 4 hours weekly.

Attended by: All noncommissioned officers.

c. *Post School.* Members of this detachment who are entirely illiterate will be required to attend the Post School from 1 to 4 PM daily, beginning September 28th.

16. INSPECTION CALENDAR.

Period: October 1 to November 30

Subject	October						November					
	6	11	14	18	29	31	7	15	18	25	28	30
Army Regulations and A.W. and Post Orders	x											
Military Courtesies, etc.		x										
Shelter Tent Drill			x									
The Soldier Dismounted				x								
The Squad					x							
The care, use, and making up of personal equipment						x						
Care of quarters							x					
Interior Guard Duty								x				
March technique, discipline, and camp expedients									x			
Platoon Drill										x		
Gas Defense											x	

Master Schedule. A master schedule is a budget of hours, issued usually in tabular form, showing the subjects of training, the approximate total number of hours to be devoted to each subject, and the allocation of these hours by weeks. It is based on the training program and used in the preparation of the weekly schedules. Subject training inspection dates are shown on the master schedule. Commanders of regiments, battalions, and companies prepare master schedules, based on the programs of the commanders of the next higher echelons. It is submitted to the next higher commander for revision or approval. It may be prepared to cover periods of time ranging from a few weeks to an entire year.

According to General Orders No. 21, War Department, 1926: "It must be impressed upon company commanders that master schedules are nothing more than work or job sheets prepared by the company commander to plan in a general way the utilization of the time available for training of his command; that when once drawn up they are not inflexible but are subject to revision in accordance with the progress of training or various local contingencies that may affect the time at his disposal. Their main purpose is to show the amount of time remaining and a tentative scheme for using it. They are entirely tentative and must be so considered."

A form for preparing a master schedule is shown in Plate 5.

Plate 5. Sample Form for the Preparation of the Master Schedule.

[illegible]

Inspection Calendars. The inspection calendar is usually issued by higher headquarters as a part of or as an appendix to the training program. It gives a list of the principal training subjects and indicates the approximate dates when training inspections in these subjects will be held. It is of value to subordinate commanders as it indicates the time allowed for reaching the training objectives in the subjects listed. For this reason, the inspection calendar is of value in the preparation of master and weekly schedules and should be closely followed. See Training Program above.

Records of Progress. Records of progress should be kept on all individual instruction conducted during the basic military and technical phases of training. This is usually accomplished by means of a progress chart which lists the subjects covered together with the names of the individuals undergoing instruction. Other progress charts may be kept for small subdivisions of the unit, such as squads, sections, and platoons. These charts, when properly kept, show clearly the progress and state of training of any individual or group. They stimulate interest and competition within the unit. Care, good judgment, and absolute fairness must be used, lest they cease to serve the purpose for which they are intended and react unfavorably on the training of the unit.

Training Guides. Experience indicates that in order to conduct training successfully, regulations and orders pertaining to the subject must be supplemented by "Training Guides" to cover each subject of training. Properly prepared training guides serve four distinct purposes:

- They assist in guiding inexperienced officers and noncommissioned officers.
- They direct and hold the attention of the instructor to the most important features of the subject.
- They insure the use of methods of training appropriate to the subject.
- They prescribe a definite training objective or standard of proficiency.

Illustrative training guide. The following illustrates a training guide for instruction in individual equipment of the Medical Department:

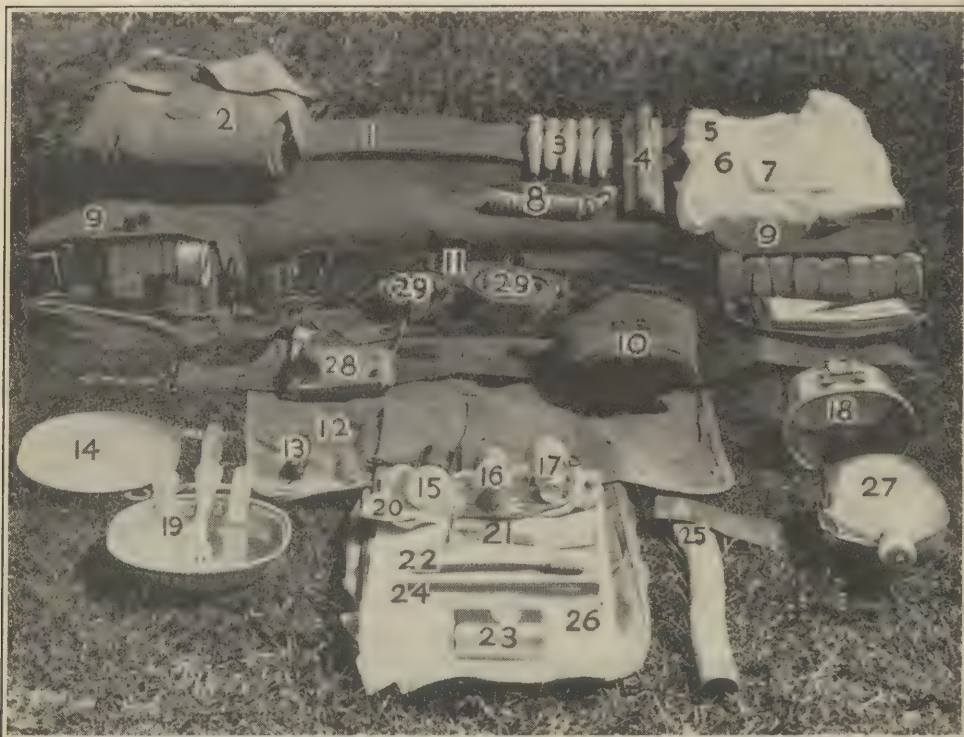


Plate 7. Display of Individual Equipment (New), Dismounted, Medical Department.

(To accompany Training Guide)

1. Shelterhalf and blanket.
2. Raincoat, $8\frac{1}{2}$ " x 10" folded flush to edges of shelterhalf.
3. Tent pins; begin 1" from pole.
4. Tent pole; end with nail toward inspecting officer.
5. Shirt; flush to edges of shelterhalf.
6. Drawers; half over shirt.
7. Handkerchief; to bottom edge and center of drawers.
8. Tent rope; 3" from pins, 1" from pole.
9. Instrument case and medical pouches; flaps underneath, tags and pencil pulled up.
10. Canteen pouch.
11. Medical suspender; no space between suspender and shelterhalf.
12. Haversack; no space between it and suspender flaps.
13. Shoe laces; 1" from edges.
14. Meat can cover; 1" from handle.
15. Shaving stick.
16. Shaving brush.
17. Toothpowder.
18. Canteen cup; line up with the outer edge of middle buckle and edge of canteen 1" from edge of haversack.
19. Meat can, knife, fork, and spoon, "U. S." up, handle 1" from edge of haversack.
20. Socks, heels to left of inspector, bottom of sock toward him, toes apart.
21. Razor; handle to the right.
22. Toothbrush; bristles up.
23. Soap.
24. Comb.
25. Handaxe; flush with edges of toilet roll and haversack.
26. Towel; fold extends to edge of haversack only.
27. Canteen, line up with edge of haversack and edge of meat can, 1" from edge of handaxe.
28. Web belt, first aid pouch.
29. Two canteen and packet straps and 2 litter carrying straps.

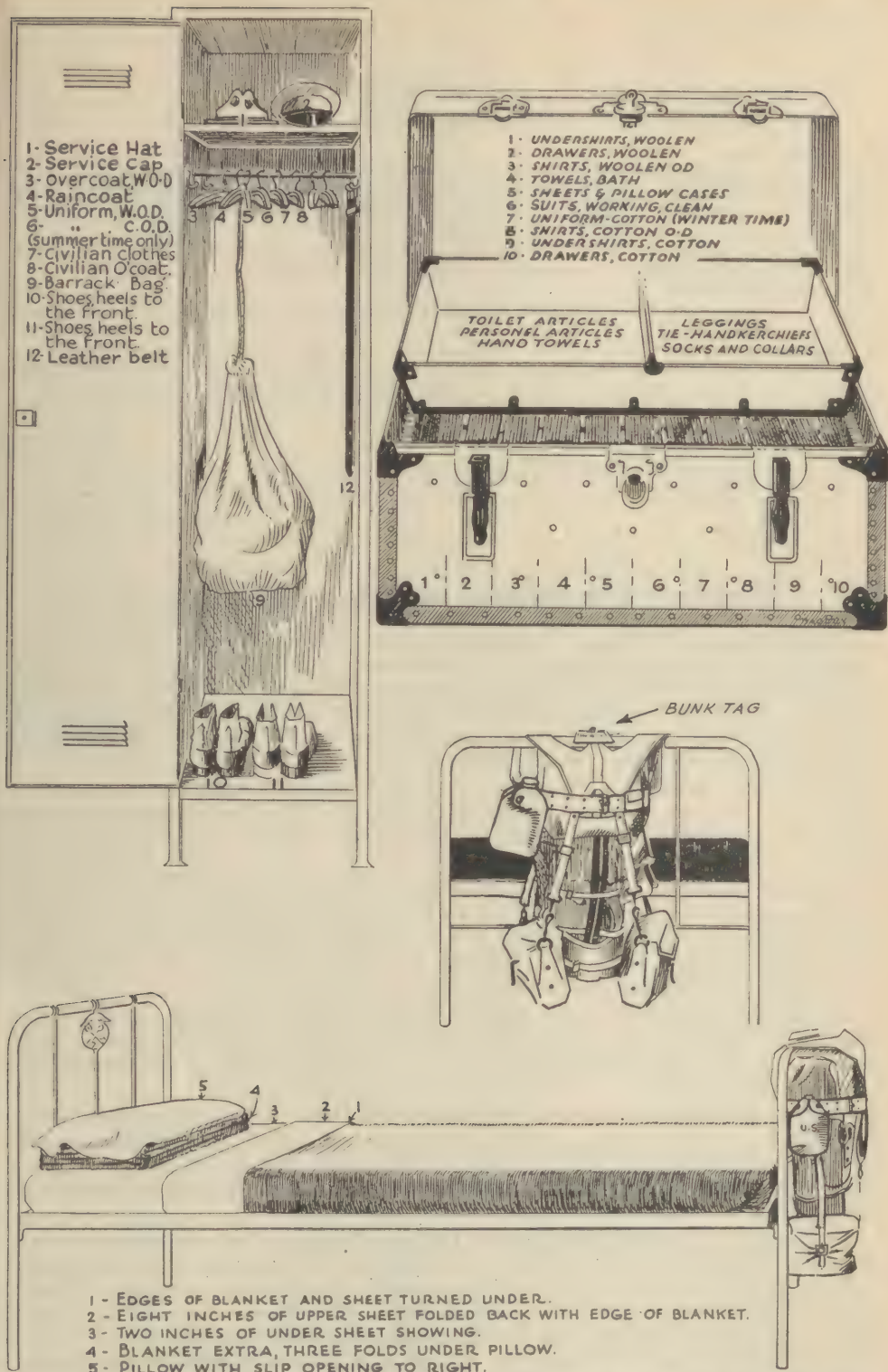


Plate 8. Suggested Arrangement of Individual Equipment and Clothing in Squad Room.

Training Guide No. ———.

Subject: Individual equipment.

I. *References:*

Basic Field Manual, Volume I, Chapter 3.

Infantry Drill Regulations, FM 22-5, Paragraph 241.

II. *Additional Data:*

The adjustment of equipment will be given constant attention by all officers and noncommissioned officers. Section leaders will be held responsible that each man of their section adjusts properly all equipment before each formation. The ability of soldiers to march reasonable distances without undue fatigue depends to a great extent upon the proper adjustment of equipment.

Each individual will receive careful training in the assembling, use, and care of his personal equipment and the manner of displaying it for inspection. (See pamphlet included.)

III. *Analysis of Instruction.*

The early training will be by the group method. Later training by organizations by application and correction of errors.

IV. *Objectives:*

All individuals to know how to wear, carry, and use the various articles of equipment issued to them, how to adjust the same properly, how to care for and clean them under all probable conditions, and how to correctly display them for inspection.

V. *Inspections:*

1. Inspector—

a. Detachment (company) commander.

2. Methods of inspection—

a. By quiz.

b. By execution.

c. By observation.

TRAINING OF THE MEDICAL UNITS FOR FIELD OPERATIONS

Responsibility for Training. The medical unit commander is responsible for the training of his unit in accordance with the instructions of the division commander or other commander of the organization to which his unit is attached. In addition to the training peculiar to the medical department, the medical unit participates in practice marches, maneuvers, and like training as conducted by the arm or service to which it is attached or of which it is an integral part.

Basic Military Training. All enlisted personnel of a medical unit are required to be proficient in the basic military subjects as prescribed in War Department orders. For basic subject and text references see the thirteen-week detailed mobilization training program included later in this chapter.

Technical Training. The technical training of the medical unit includes all of the special training and instruction required for its administration and to enable it to perform the technical services for which it is responsible. For technical training subjects of divisional medical units and attached medical personnel see the thirteen-week mobilization training program included later in this chapter.

Tactical Training. The tactical training includes logistical movements of the medical unit and the operation and function of the various medical installations operated by the unit in the field, in combined field exercises and under combat conditions with the associated arms.

Training of Medical Department Officers for Field Duty. Medical Department officers are trained in administration, methods of training, field hygiene and sanitation, supply, military law, combat principles of arms to which their unit is assigned or attached, field orders, standing operating procedures, map reading and sketching to include the interpretation of aerial photographs, and field fortifications.

The Medical Department Mobilization Training Program. For the purpose of establishing uniform training for all units of the Medical Department upon mobilization or for purposes of training in peacetime, a mobilization training program of thirteen weeks has been prepared for distribution to Medical Department units at Unit Training Centers, at Enlisted Replacement Centers, or at other training areas where medical personnel are undergoing training. It was published by the War Department on September 9, 1940. An extract copy of this training program follows.

Mobilization Training Program
No. 8-1

MEDICAL DEPARTMENT MOBILIZATION
TRAINING PROGRAM

for

Medical Department units at Unit Training Centers and Medical Department replacements at Enlisted Replacement Centers and technicians of the Medical Department.

Section I

GENERAL

1. *Authorization.*—This Mobilization Training Program is issued in compliance with MR 3-1.

2. *Purpose.*—The purpose of this program is to furnish a general guide for the balanced training of medical units so that they may be prepared to take the field on short notice.

3. *Application.*—a. The Training Programs herewith apply to all types of medical field units. Based on these programs, weekly training schedules will be prepared by responsible commanders.

b. The instruction day is assumed to be 8 hours. More time per day may be utilized when desirable, especially in connection with marches, field exercises, and the like. The open time will be used to compensate for interruptions to bring units or individuals up to standard, or to provide refresher training.

c. In order to obtain the latest references, it is essential to consult the most recent edition of FM 21-6 which contains a list of training publications and which is frequently revised. Normally, Field and Technical Manuals will contain sufficient instructional matter for training purposes. Other text references such as Army Regulations have been included to assist the instructor. The references to "standard text" indicate authority to employ any civilian text satisfactorily covering the details of the subject.

Pending Receipt of	Use	Pending receipt of	Use
FM 5-15	TR 195-5, 195-50.	TM 8-210	When published.
7-5	When published.	8-220	Tuttle's Handbook.
8-5	When published.	8-225	When published.
8-35	TR 405-50, 405-60.	8-227	When published.
8-45	When published.	8-230	When published.
8-50	When published.	8-233	When published.
21-5	TR 10-5.	8-238	When published.
21-15	Ch. 3, BFM, Vol. I; TR	8-240	When published.
	225-5, 225-15.	8-255	Army Medical Bulletin
21-20	Ch. 4, BFM, Vol. I.		No. 23.
21-45	Ch. 9, BFM, Vol. I.	8-270	When published.
21-50	Ch. 1, BFM, Vol. I.	8-275	When published.
100-10	When published.	10-405	TM 2100-152.
		10-410	TM 2100-151.

4. *Modification.*—a. The character of operations which will be required, the character and armament of the enemy, the probable theatre of operations, including the geographical, topographical, sanitary, and climatic conditions therein and the results that may be expected should always be considered. The programs may, therefore, require modification to adapt them to the type of medical unit to be trained, to meet the status of the individual or unit, to shorten or lengthen the time of training in order to conform to the time available, to make the best use of existing facilities and of training expedients, and to conform to the climatic or other conditions of the training situation. Progressive and balanced training in subjects essential to accomplish the training mission, however, must be preserved at all times.

b. In order that prompt recommendations may be submitted when called for,

each activity using these training programs will keep a folder of suggested changes. Serious errors or omissions will be reported at once.

5. *Scope of instruction.*—*a. Unit Training Center.*—(1) *Basic period (1st and 2d weeks).*—The training of the individual enlisted man will be stressed. At the end of the period he should be able to wear, display, and properly care for his uniform and equipment; to march and pitch shelter tent; and to understand the essentials of the basic subjects prescribed in this program.

(2) *Technical period (3d to 10th weeks, incl.).*—Training of the individual enlisted man continues, but stress is placed upon basic technical subjects which fit him for his place in the unit. In addition to the basic technical subjects, specialized training and tactical and logistical training is started.

(3) *Tactical period (10th to 13th weeks, incl.).*—At the end of this period the medical unit should be able to march and execute tactical movements with facility, to establish and operate station, to collect and treat casualties in the field, to operate battalion or regimental dispensaries, and to participate with the associated arms in field exercises and under combat conditions.

b. Enlisted Replacement Center.—(1) *First or basic period (1st and 2d weeks for all trainees).*—As prescribed for the basic period of Unit Training Center (see par. 5a (1)).

(2) *Second period (3d to 13th weeks, incl.).*—For this period trainees are divided into basics and specialists. Training of the individual enlisted man continues, but emphasis is placed on the basic technical subjects to prepare him for his place in the organization to which he is to be assigned. The training time varies depending upon the duty for which he is being trained and his ability, but the maximum time allowable in the replacement center will be 13 weeks. Normally, individuals qualified to receive training in the Medical Department specialties as dental, laboratory, pharmacy, medical, surgical, sanitary, veterinary, and X-ray technicians will be selected out by the end of 4, 8, or 12 weeks and sent to Medical Department special service schools, existing general hospitals, and certain civilian educational institutions for 8 or 12-week enlisted specialist courses.

c. Subjects.—(1) *Basic course.*—The essential minimum of military instruction consists of the following instruction which must be completed within the first two weeks:

(a) *Military courtesy and discipline.*—Understanding of the necessity for discipline; the punitive Articles of War; the penalties for violation; and the methods of administering military justice. Understanding of the essentials of correct military conduct. This latter instruction should be supplemented by continuous attention to its application during all subsequent training.

(b) *Military sanitation and first aid.*—Understanding of the importance of personal hygiene (including sex hygiene), the prevention of venereal disease, group sanitation and the rules for maintaining sanitary conditions, particularly in the field. Understanding of the proper rendering of first aid to the wounded and gassed. Practice in the use of the first-aid packet, splints, and tourniquets.

(c) *Equipment, clothing, and tent pitching.*—Practical knowledge of the care and preservation of arms, equipment, and clothing; the assembling, adjusting, and caring of individual equipment; the pitching and striking of shelter tents; inspection formations; and the correct manner of displaying clothing and equipment.

(d) *Physical training.*—Participation in group calisthenics for improving the physical condition of the individual.

(e) *Drill for foot troops.*—Ability to execute the individual movements and those of close formation with reasonable precision.

(f) (Practical knowledge of the use of weapons sufficient to insure the observance of safety precautions and the ability to load, aim, and fire.) As far as practicable this instruction should be given those techniques appropriate to the Medical Department.

(g) *Guard duty.*—Practical knowledge of the duties of a sentry on interior guard duty.

(h) *Marching and bivouac*.—Understanding of march discipline and technique. Ability to march with a unit carrying full field equipment and to occupy and break bivouac. During this training, opportunities should be created for supplementing and practicing the instruction contained in subparagraphs *b*, *c*, *g*, and *i*.

(i) *Individual defense measures*.—Practice in the use and wearing of the gas mask. Identification of and means of defense against hostile chemical agents. Elementary knowledge of how and when the enemy may use such agents. Knowledge of the essentials of scouting and patrolling and the use of cover and concealment. Understanding of the location and construction of individual shelter and the use of camouflage. Knowledge of the ways of identifying aircraft and armored troops, the markings identifying hostile aircraft and armored troops, the passive measures of antiaircraft and antimechanized defense.

(2) *Technical, tactical and logistical*.—See Training Program, Medical Units at Unit Training Centers and for individuals at Enlisted Replacement Centers.

(3) *Technicians, Medical Department*.—The scopes of instructions with minimum standards have been outlined for technicians, Medical Department (see section III). Detailed programs covering these specialties will be prepared by special service schools as follows:

Sanitary technicians	Medical Field Service School.
Dental, laboratory,	
pharmacy, medical,	
surgical, veterinary,	
and X-Ray	Professional service schools.

(4) *Administrative specialists*.—Insofar as practicable, the administrative (common) specialists will receive instruction concurrently with the instruction of the unit as a whole. Within the discretion of the commanders, Unit Training and Enlisted Replacement Centers, administrative specialists will be excused from instruction in the subjects not particularly allied to their specialist duty, provided they have been thoroughly qualified in the basic subjects. Instruction for administrative specialists will be given in schools operated by an organization or branch in which the particular subject is a major project. Detailed programs for the administrative specialists (common) prepared by other arms or services may be used.

For examples of detailed program for administrative specialists (mess sergeants, cooks, and for clerks) see tables following the detailed program shown hereafter. For schedules of instruction, driver training, see appendix FM 25-10.

SECTION II DETAILED PROGRAMS Organizations

Subject ^a	Total Hours	Hours per week													Text reference
		Basic Train- ing	Total period may be telescoped and made of varying length.												
			1	2	3	4	5	6	7	8	9	10	11	12	13
BASIC															
Military courtesy and discipline -----	2	2													MCM; AR 600-355 and 615-290; *FM 21-50.
Military sanitation and first aid -----	4	4													FM 21-10.
Care of clothing and equipment -----	5	2	2	1											*FM 21-15.
Individual defense against chemical warfare -----	5	2	3												FM 21-40.
Individual defense against air and mechanized attack ---	5	1	1	1	1	1									FM 100-5; Training Cir. No. 3 War Dept. Sept. 23, 1940.
Interior guard and close order drills -----	32	7	7	3	3	3	3	2	1	1	1		1		FM 22-5 and FM 23-5.
Equipment, clothing and tent pitching -----	6	2	4												*FM 21-15.
Marches and bivouacs -----	45	6	9	3	3	4	4	4	4	4	2	2			FM 100-5 and 21-10.
Physical training group games and mass athletics ^b -----	(39)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	*FM 21-20
TECHNICAL															
Hasty entrenchments and shelter (camouflage) -----	12								4		4		4		FM*5-15 and 5-20.
Drill, motor ^c carriers and motor units ^b ---	(3)														FM 23-5.
Motor vehicles, care, operation, and convey ^d -----	(76)														AR 850-15; FM 25-10.
Map and aerial photograph reading ^e -----	(16)														*FM 21-25.
Movement by motor trucking and detrucking ^f -----	4						2			2					FM 25-10 and 100-5.
Movement by rail, entraining and detraining -----	4													2	FM*7-5, 25-10, 100-5, and*100-10.
Loading and handling cargo ^g -----	(4)														FM 25-10.
MEDICAL DEPARTMENT TRAINING															
Elementary anatomy and physiology -----	21	1	1	2	2	3	4	4	4						*TM 8-220.
Nomenclature and care of organization equipment -----	6	2		2	2										Medical supply catalogue TBA, M.D.
Field medical records --	5	1	2			2									*FM 8-10; 8-220.
Treatment of gas casualties -----	8			4				2	2						*FM 8-45.
Litter drill, including ambulance loading and unloading; and passage of obstacles -----	10	2	2	2	2		2								FM 21-10; *TM 8-240.
Field sanitation and sanitary appliances ---	20		1	3	2	2	4	4	4						*FM 8-35.
Materia medica and pharmacy -----	12	1	1	4	2	2		2							FM 21-10 and 8-40; *TM 8-255.
Medical and surgical nursing -----	16	1	1	2	4	2	2	2	2						*TM 8-220.
Heavy tent pitching ---	6	2			2		2								*TM 8-220.
Organization and function of the arms -----	9	1		3		3		2							*TM 8-220.
Organization and function of the medical unit -----	9		1	1	2	3	2								*FM 21-15.
Medical aid (splints and splinting; bandages and dressings) -----	67	1	4	8	8	8	8	10	8		6	4	2		FM 6-20 and 7-5.
															*FM 8-5 and 8-10.
															*TM 8-220; *FM 8-50 and 21-10.

DETAILED PROGRAMS—Continued

TACTICAL AND LOGISTICAL																	
Scouting and patroling, use of cover and concealment -----	6	3		3													*FM 21-45.
Orientation in night combat -----	14					2	2	2	(84)	(84)							FM*7-5 and 100-5.
Communications in combat -----	10									3	2	(83)	(82)				FM 24-5.
Unit training (medical units) ^{b 1 1} -----	122			1	1	4	3	4	10	20	20	20	20	19			*FM 8-5 and 8-10.
Battalion tactical training ^{b 1} -----	(816)									4		4	(16)				FM 6-20, 7-5, and 8-10.
Regimental tactical training ^b -----	16										2	2	4	8			FM 6-20, 7-5, and 8-10.
Troop movements by motors ^b -----	16													8	8		FM 6-20, *7-5, 25-10, and 100-5.
Inspections -----	17	1	1	1	2	1	2	2	1	2	1	1	1	1	1		*FM 7-5.
Open time [*] -----	50	2	4	4	4	4	4	4	4	4	4	4	4	4	4		
Total -----	572	44	44	44	44	44	44	44	44	44	44	44	44	44	44		

*See paragraph 3c.

NOTES

- ^a Letters appearing in parentheses apply to individuals whose duties require this training. These individuals may take this training with organizations in which this subject is a major project.
- ^b Physical training may be given as 30-minute periods in calisthenics each morning except Sunday or as group games or mass athletics on Saturday afternoons.
- ^c Preliminary training preparatory to drill with company or higher units.
- ^d Applies to individuals charged with care, operation, or maintenance of a motor vehicle. Training may be with service company or headquarters batteries, for medical detachments of infantry or artillery regiments, or with motor transport schools.
- ^e Applies to chauffeurs, motorecyclists, messengers, buglers, or contact men of medical battalions or regiments.
- ^f Practice in entrucking and detrucking only; 2 hours daylight, 2 hours dark.
- ^g Applies to chauffeurs of motor trucks and carriers.
- ^h This time available to Medical Department professional units for technical employment in operation of stations. See note 1, which indicates the detailed training to be given to elements of medical units.
- ⁱ Unit training covers the training necessary for the technical and tactical employment of the medical field unit such as establishment and operation of station; collection and treatment of casualties in the field; the operation of a regimental and battalion dispensaries; and the preparation for participation with the associated arms in field exercises and under combat conditions. See note 1 which indicates the detailed training to be given to elements of medical units.
- ^j Applies to battalion sections of regimental medical detachments and such other personnel as needed.
- ^k Open time to be used for additional training, when necessary, and regimental inspections and ceremonies.

Training subject	Elements and hours				
	Medical detachments	Headquarters and service	Collecting	Clearing	Ambulance
Functions and combat dispositions of sections of headquarters and service, collecting, ambulance, or clearing elements -----	--	20	20	20	20
Reconnaissance, use of cover and concealment -----	10	10	10	10	10
†Collection and evacuation of casualties from the field (day and night) -----	40	--	40	--	--
†Ambulance driving shuttle (day and night) -----	--	--	--	--	20
†Ambulance driving convoy (day and night) -----	--	--	--	--	20
†Nursing and ward management -----	--	--	--	40	--
†Transportation and supply requirements -----	--	20	--	--	--
†Procurement and issue of supplies -----	--	20	--	--	--
Selection and occupation of various station sites, and the functioning of such stations -----	20	20	20	20	20
Forward displacements and withdrawals during action -----	10	10	10	10	10
Operation of regimental and battalion dispensaries -----	20	--	--	--	--
Battalion or regiment training -----	22	22	22	22	22
Total -----	122	122	122	122	122

†To be carried on concurrently in elements which have the subject as a major project.

Subject	Total Hrs.	Hours per week												Text reference
		3	4	5	6	7	8	9	10	11	12	13		
BASIC (all individuals)	†													
Dismounted drill -----	111	1	1	1	1	1	1	1	1	1	1	1	1	FM 22-5.
Physical training -----	111	1	1	1	1	1	1	1	1	1	1	1	1	*FM 21-20.
Inspections -----	22	2	2	2	2	2	2	2	2	2	2	2	2	*FM 21-15.
Total basic -----	44	4	4	4	4	4	4	4	4	4	4	4	4	
TECHNICAL														
Morning report, sick report, duty roster -----	8	8												AR 345-25, 345-400 and 345-415.
Military correspondence, field artillery organization -----	20	20												AR 340-15; *FM 8-5; appropriate T of O's.
Typing -----	40	8	12	12	8									Standard text.
Army Regulations -----	20		12	8										AR 1-15 and 35-series.
Use of all War Department forms -----	48		12	16	20									AR 345-series.
Field desks and contents; fil- ing -----	8				8									AR 345-620, section X, SR 57 (1919).
Practical duties -----	\$164					28	28	28	20	20	20	20	20	
Total technical -----	308	36	36	36	36	28	28	28	20	20	20	20	20	
TACTICAL														
Field exercises, marches, camps -----	88					8	8	8	16	16	16	16	16	*FM 8-5, 8-10, 21-5, and 21-10.
Open time -----	44	4	4	4	4	4	4	4	4	4	4	4	4	
Grand total -----	484	44	44	44	44	44	44	44	44	44	44	44	44	

* See paragraph 3c.

† All individuals for the first two weeks will receive the same basic instruction. They will then be assigned to units, depending upon their qualifications for the remainder of the training period.

‡ Ceremonies and organized athletics will be conducted during other than scheduled hours.

§ Practical duties (7th to 13th weeks) and preliminary instruction (3d to 6th weeks) are mutually interchangeable at times.

MESS SERGEANT (124) AND COOK (060)

Subject	Total Hrs.	Hours per week												Text reference
		3	4	5	6	7	8	9	10	11	12	13		
BASIC (all individuals)	†													
Dismounted drill -----	111	1	1	1	1	1	1	1	1	1	1	1	1	FM 22-5.
Physical training -----	111	1	1	1	1	1	1	1	1	1	1	1	1	*FM 21-20.
Inspections -----	22	2	2	2	2	2	2	2	2	2	2	2	2	*FM 21-15.
Total basic -----	44	4	4	4	4	4	4	4	4	4	4	4	4	
TECHNICAL														
Cooks, general duties; mess sanitation -----	8	8												*TM 10-405; AR 40-205.
Care of all kinds of foods -----	8	8												*TM 10-405.
Preparation (cooking and baking) of various kinds of food; nutrition -----	64	20	24	20										*TM 10-405 and 10-410.
Meat cutting -----	16		8	8										*TM 10-405.
Mess management; menus; accounts; all types of rations -----	24		4	8	12									*TM 10-405; AR 30-2210.
Field cooking -----	16				16									*TM 10-405.
Messing on trains and transports -----	8				8									*TM 10-405; Clr. 56, W.D., 1940.
Practical cooking -----	\$164					28	28	28	20	20	20	20	20	
Total technical -----	308	36	36	36	36	28	28	28	20	20	20	20	20	
TACTICAL														
Field exercises, marches, camps -----	88					8	8	8	16	16	16	16	16	*FM 8-5, 8-10, 21-5, and 21-10.
Open time -----	44	4	4	4	4	4	4	4	4	4	4	4	4	
Grand total -----	484	44	44	44	44	44	44	44	44	44	44	44	44	

* See paragraph 3c.

† All individuals for the first two weeks will receive the same basic instruction. They will then be assigned to units, depending upon their qualifications for the remainder of the training period.

‡ Ceremonies and organized athletics will be conducted during other than scheduled hours.

§ Practical cooking (7th to 13th weeks) and preliminary instruction (3d to 6th weeks) are mutually interchangeable at times.

SECTION III

TRAINING PROGRAMS FOR MEDICAL DEPARTMENT TECHNICIANS

The detailed training programs for each specialty will be prepared by the professional service schools with reference to dental, laboratory, medical, surgical, pharmacy, veterinary and X-Ray technicians; and by the Medical Field Service School for sanitary technicians. The following training programs are for Medical Department technicians selected for this training after 4, 8, or 12 weeks' training (See par 5b (2)). The following paragraphs prescribe the scope of instruction and training qualifications of each technician; text references and suggested allotment of hours are included.

DENTAL

Training qualifications

a. Junior dental technician, 5th class.

(1) Graduate of the technicians' course at the Army Dental School or the equivalent knowledge of dental laboratory procedure from civil or military training or experience.

(2) Capable of constructing simple or routine prosthetic appliances and relating work under direct supervision.

(3) Mechanical ability, manual dexterity, and ingenuity in dental laboratory procedure.

b. Dental technician, 4th class.

(1) Qualifications of junior dental technician (a. above).

(2) Capable of constructing routine prosthetic appliances and related work as outlined by the dental officer in charge.

(3) Skilled in one or more of the following branches of mechanical dentistry.

(a) Bridgework; assembling, soldering, and finishing.

(b) Dentures, full and partial. Setting up teeth, packing, vulcanizing, and finishing.

(c) Gold and chrome alloy castings: waxing, casting, and finishing.

(d) Wrought clasps, lingual and palatal bar bending.

(e) Dental ceramics.

c. Senior dental technician, 3d class.

(1) Qualifications of dental technician (b. above).

(2) Superior ability in the construction of routine prosthetic appliances and related work as outlined by the dental officer.

(3) Qualified as assistant supervisor or instructor under the direction of the dental officer in charge.

(4) Familiar with maintenance and ordering of dental supplies.

d. Expert dental technician, 2d class.

(1) Qualifications of senior dental technician (c. above).

(2) Basic knowledge of all the standard practices and processes of mechanical dentistry.

(3) Expert skill and wide experience in dental laboratory procedure.

(4) Thorough working knowledge in special dental technique.

(5) Ability to perform independently difficult work as outlined by the dental officer.

(6) Qualified instructor of subordinate dental technicians.

e. Master dental technician, 1st class.

(1) Qualifications of expert dental technician (d. above).

(2) Expert knowledge of all standard practices and processes in mechanical dentistry demonstrated during long and excellent service.

(3) Ability to take charge of a large dental laboratory under the supervision of an officer.

SCOPE OF INSTRUCTION AND TEXT REFERENCES

Subject	No. hours	Scope of instruction (minimum standards to be reached)	Text reference
Dental anatomy	30	Nomenclature; surfaces and angles; upper and lower teeth; bones of the head; mandible and maxillae; muscles of mastication.	AR 615-20; *TM 8-225.
Oral bacteriology	34	First hour of each period will consist of a lecture, followed by a practical laboratory exercise. Care and use of the microscope; smear preparation; staining technique; sterilization of laboratory glassware; micro-organisms of the mouth; oral infections; dark field preparation, sterilization of dental instruments.	*TM 8-225.
Oral hygiene	70	Manikin instruction and practical cases.	*TM 8-225.
Dental prosthesis	320	Full and partial denture prosthesis; tooth carving; care of laboratory equipment, composition of dental materials.	*TM 8-225.
Dental Roentgenology	74	Instruction in use of U. S. Army bedside X-ray unit.	U. S. Army X-ray Manual; *TM 8-225.

*See paragraph 3c.

LABORATORY (MEDICAL AND VETERINARY)

*Training qualifications**a. Junior laboratory technician, 5th class.*

A graduate of the course for laboratory technicians, Army Medical School or an equivalent course in a civil institution or the equivalent in practical experience, and able to perform the following:

- (1) Cleaning and sterilization of laboratory glassware and equipment under direct supervision.
- (2) Ordinary routine laboratory procedures such as urinalysis, blood counts, preparation and staining of slides and care of cultures.
- (3) Care of laboratory animals.
- (4) Preparation of routine culture media.

b. Laboratory technician, 4th class.

Qualified as in *a* above and able to perform the following:

- (1) All routine tests on blood, urine, sputum, stools, and pus exudates.
- (2) Elementary bacteriology and agglutination and serological tests.

c. Senior laboratory technician, 3d class.

Qualified as in *b* above and able to perform the following:

- (1) Medical.
 - (a) Preparation of all stains, solutions, and media.
 - (b) Routine procedures in any department of a corps area or similar laboratory.
 - (c) The preservation, preparation, and mounting of pathological materials.
- (2) Veterinary:
 - (a) As (1) above.
 - (b) Ability to conduct under supervision, quantitative and qualitative laboratory examinations of meat, meat food and dairy products, and forage.

d. Expert laboratory technician, 2d class.

Qualified as in *c* above and able to perform the following:

- (1) Train laboratory technicians in lower grades in the performance of routine laboratory tests.
- (2) Assume technical charge of one or more divisions of a corps area laboratory or equivalent.
- (3) Carry out, under supervision, more complicated laboratory tests in serology, chemistry and pathology.

e. Master laboratory technician, 1st class.

- (1) Qualified as in *d* above.
- (2) Special ability in one or more laboratory specialties, demonstrated during long and excellent service.
- (3) Ability to take charge of any corps area laboratory or equivalent under direction of an officer.

SCOPE OF INSTRUCTION AND TEXT REFERENCES

Subject	No. Hours	Scope of instruction (minimum) standards to be reached	Text reference
Bacteriology	150	Laboratory equipment, use, cleaning, and sterilization. Preparation of stains, solutions and media. Care and use of microscope. Weight and measures. Culturing routine specimens of sputum, blood, urine, feces, and purulent material. Recognition of some common pathogenic bacteria. Preparation, shipment, and handling of specimens. Laboratory animals, care of and uses.	AR 615-20; *TM 8-227 and 8-270.
Chemistry	100	Elementary chemistry, definitions, terms, cleaning and care of glassware. Solutions and titrations. Urine, ordinary chemical and microscopic examinations. Gastric contents.	
Feces, Examination for helminths and protozoa.	48	Routine methods of stool examination. Identification of human parasitic worms, their ova and protozoa. Culturing of amoeba histolytica.	
Blood Examination for malaria.	50	Methods of staining and identification of the plasmodia of malaria.	
Hematology	60	General knowledge of characteristics of human blood. Knowledge of commonly used terms. Complete blood counts on at least 100 individuals. Estimation of hemoglobin, coagulation and bleeding time. Care of apparatus. Stains and solutions.	
Pathology	50	Care of autopsy room. Preparation of material for sectioning and staining. Duties of an assistant.	
Serology—Wassermann and Kahn reactions, the colloidal gold test, blood grouping.	70	Technique of obtaining blood and its preparation for the tests. Theory, description, and requirements of these tests, by demonstration. Cleaning and care of glassware.	AR 615-20; *TM 8-227 and 8-270.

MEDICAL

Training qualifications

a. Junior medical technician (assistant wardmaster), 5th class.

Competent to:

- (1) Take temperature, pulse, and respirations.
- (2) Cleanse and disinfect ordinary ward equipment.
- (3) Care and maintenance of ordinary ward property, linen, and equipment.
- (4) Serve ward diets.
- (5) Sterilize ward instruments.

b. Medical technician (wardmaster), 4th class.

Qualified as in *a* above and competent to:

- (1) Act as a practical nursing assistant.
- (2) Prepare and serve simple ward diets.
- (3) Prepare and maintain ward records (administrative and professional).
- (4) Give enemas and baths to patients.
- (5) Administer routine medications.

c. Senior medical technician (assistant nurse), 3d class.

Qualified as in *b* above and competent to

- (1) Act as a nursing assistant in special cases, as acute infectious and contagious or neuropsychiatric cases.
- (2) Administer hypodermic medications and do catheterizations.
- (3) Set up, maintain, and operate specialized equipment.

d. Expert medical technician (junior nurse), 2d class.

Qualified as in *c* above and competent to:

- (1) Take charge of the ward nursing service in the absence of Army Nurse Corps personnel.
- (2) Special skill and experience in genito-urinary, physiotherapy, and neuropsychiatric nursing.

e. Master medical technician (nurse), 1st class.

- (1) Qualified as in *d* above.
- (2) A registered nurse or graduate of a recognized school for male nurses or has the equivalent in practical experience as demonstrated by long and excellent service.

SCOPE OF INSTRUCTION AND TEXT REFERENCES

Subject	No. hours	Scope of instruction (minimum) standards to be reached)	Text reference
General	50	Responsibility of public property; patients' property and effects; general rules of Medical Department, duties of sanitation, personal and general. Personal effects in case of death; care of linen, soiled and clean; special linen.	AR 40-590, *TM 8-220 and 8-230.
Ward management	110	Duties of ward master. Duties of ward attendants. Ward discipline. Prison wards. Care of ward supplies, medicines, alcohol, narcotics, whiskey, and poisons. Isolation of infectious and noninfectious cases. Care of seriously ill cases. Care of insane. Ward bed, furniture, and linen disinfection. Disposal of human waste. Care of mail and telegrams.	AR 40-590, *TM 8-220 and 8-230.
Medical records	60	Admission cards (55a). Medical Department forms, 55-series. Interward transfer cards. Diet lists. Ward morning reports. Laundry lists, special laundry lists. Patients, property cards. Medical Department property cards (issue, exchange, credit) Disposition roster. Change of diagnosis cards. Seriously ill list. Report of contagious cases. Register sick and wounded cards. Report sick and wounded. Malarial and syphilitic register. Patients' pass lists. Notice of death. Duty cases. Filing of all records.	AR 40-590, 40-1005, 40-1025, and 40-1030; *TM 8-220 and 8-230.
Care of patients	120	Admission. Bathing of all types and reasons for same. Taking and recording temperature, pulse and respiration. Change of appearance of patients. Bed making, and changing linen. Use of urinals and bed pans, alcohol rubs. Care of hair, mouth, and nails. Care of and disposal of the dead.	AR 40-590, *TM 8-220 and 8-230.
Treatments	130	Administration of medicines, routines and special; ice bags; hot water bags, uses and placing of same; turpentine stupes; enemas all types, their composition, use and method of administration. Care of drowning, sunstroke, heatstroke, electrical shock.	AR 40-590; *TM 8-220.
Diets	58	Care of dishes. Set-up of tray. Size of servings. Disposal of garbage. Feeding of patients. Bed trays. Use of feeding tube. Diets—liquid, soft, light, regular and special. Liquid nourishment cold and hot drinks, fruit juices water (ice and tap water).	*TM 8-220.

*See paragraph 3c.

PHARMACY

*Training qualifications**a. Junior pharmacy technician, 5th class.*

Ability to:

- (1) Care and clean equipment in pharmacy.
- (2) Care for stock of drugs, chemicals, and pharmaceutical preparations.
- (3) Dispense routine stock preparations to wards.
- (4) Do simple pharmaceutical arithmetic to include the metric system, ratio and proportion.
- (5) Perform simple pharmacy procedures, such as clarification and simple comminutions processes.

b. Pharmacy technician, 4th class.

- (1) Qualified in the performance of the duties of junior pharmacy technician (*a* above).

- (2) Qualified in:

- (a) Management and administration under supervision of the pharmacy stock room.
- (b) The pharmacy of and routine manufacture, under direct supervision, of Galenical individual and stock preparations.
- (c) Supervision of routine dispensing of medicines to wards and departments.
- (d) Pharmaceutical arithmetic.
- (e) The use of the United States Pharmacopoeia, the National Formulary, and other authorized texts.

c. Senior pharmacy technician, 3d class.

- (1) Ability to perform the duties of pharmacy technician (*b* above).

- (2) Ability to perform under general supervision the following:

- (a) Management of the prescription department.
- (b) The compounding of prescriptions and stock solutions and the maintenance of required records.
- (c) Dispensing of narcotic and alcoholic preparation and the maintaining of required records.
- (d) Prescription compounding including common incompatibilities, with special reference to the formation of dangerous and toxic substances.
- (e) The instruction of pharmacy technicians of the lower grades.

d. Expert pharmacy technician, 2d class.

- (1) Ability to perform the duties of senior pharmacy technician (*c* above).

- (2) Expert in:

- (a) Management of a large hospital pharmacy, training of pharmacy technician and preparation of solutions for hypodermic and parenteral injections, under supervision.
- (b) Knowledge of the following:
 1. Pharmaceutical arithmetic in all its phases.
 2. Pharmacy and pharmacology to include thorough knowledge of the principles involved in dispensing and compounding required in a large hospital pharmacy.

e. Master pharmacy technician, 1st class.

- (1) Ability to perform the duties of pharmacy technicians of lower grades.

- (2) Expert in:

- (a) General management of a pharmaceutical laboratory and its various functions.
- (b) The performance under supervision of routine assays and chemical analysis of drugs and pharmaceutical preparations.
- (c) Knowledge of the following:
 1. Pharmaceutical and chemical mathematics.
 2. The source, preparation, common adulterations, and impurities in drugs and medicinal preparations.
 3. Materia medica and therapeutics.
 4. Pharmaceutical chemistry.

SCOPE OF INSTRUCTION AND TEXT REFERENCES

Subject	No. hours	Scope of instruction (minimum standards to be reached)	Text reference
General	20	Care of equipment (apparatus). Care of store room stock and identification of items on Medical Department Supply Tables.	Medical Department Supply Catalogue;
Pharmaceutical apparatus	25	Description and uses of all equipment used in pharmacy.	*TM 8-220 and 8-233.
Requisitions	34	Requisitioning of standard non-standard, and emergency items. Deteriorating drugs, serums, and vaccines.	Medical Department Supply Catalogue; *TM 8-233
Metrology	60	Metric weights and measures and their equivalents in the apothecaries' system. Percentage solutions.	*TM 8-220 and 8-233.
Materia medica	108	Derivation, nomenclature, and therapeutic action, posology, and toxicology of drugs. Solubility of drugs.	*TM 8-220 and 8-233.
Incompatibility	40	Chemical, pharmaceutical, and therapeutical incompatibilities of drugs and chemicals.	*TM 8-220 and 8-233.
Pharmaceutical Chemistry	80	Fundamental principles of chemistry.	*TM 8-220 and 8-233.
Charges for medicines	6	Collections for medicines from civilians eligible to purchase in military pharmacy. Report of sales. Disposition of funds.	AR 40-590.
Alcohol, whiskey, narcotics, and poisons	6	Methods of storing, dispensing, and records kept of same. Narcotic register.	*TM 8-220 and 8-233; AR 40-590.
Records	34	Various methods of filing prescriptions and records kept of same.	*TM 8-220 and 8-233; AR 40-590.
Prescriptions	100	Reading, filing, and dispensing prescriptions.	*TM 8-220 and 8-233; Remington's Practice of Pharmacy, Chapter 96.
Deteriorating drugs and chemicals	6	Care of all drugs and chemicals which deteriorate.	*TM 8-220 and 8-233; Medical Department Supply catalogue.
Serums and biological products	6	Methods of storage and proper care of same.	*TM 8-220; Medical Department Supply catalogue. Remington's Practice of Pharmacy, Chapter 118.

*See paragraph 3c.

SANITARY

*Training qualifications**a. Junior sanitary technician, 5th class.*

A graduate of the course for sanitary technician, Medical Field Service School, or an equivalent course in a civil institution or the equivalent in practical experience, and qualified in the following:

- (1) Construction and operation of field sanitary devices for disposal of wastes.
- (2) Supervision of minor fly and mosquito control work, and collecting of epidemiological material for examination.

- (3) Preparation of routine forms pertaining to sanitation.

b. Sanitary technician, 4th class.

Qualified as in *a* above and able to perform the following:

- (1) General inspection of sanitary devices, and application of control measures for one type of communicable disease.

- (2) Compilation and preparation of routine statistical records and reports.

c. Senior sanitary technician, 3d class.

Qualified as in *b* above and able to perform the following:

- (1) Routine area inspections under supervision, and the application of control measures for at least two (2) types of communicable disease.

- (2) Supervise installation of field sanitary appliances and instruct others in their operation.

- (3) Computation of rates and preparation of graphs and sanitary reports.

d. Expert sanitary technician, 2d class.

Qualified as in *c* above and able to perform the following:

- (1) Act as assistant to sanitary inspector of large tactical command or geographical area.

- (2) Direction of field measures for control of major epidemic disease.

e. Master sanitary technician, 1st class.

Qualified as in *d* above with expert ability as demonstrated by long and excellent service in the lower classes and in addition able to perform the following:

- (1) Assist in making area sanitary surveys and in gathering data for special sanitary reports.

- (2) Technical supervision of a large field sanitary force.

SCOPE OF INSTRUCTION AND TEXT REFERENCES

Subject	No. hours	Scope of instruction (minimum standards to be reached)	Text reference
Communicable diseases and their control in general	40	The disease to be controlled, methods of study and measurement—general control measures.	AR 40-205 and 40-210; *FM 21-10; *TM 8-210.
Respiratory diseases	100	Familiarity with their nature; methods of spread and control; the students to learn how to apply all control measures.	AR 40-220; *FM 21-10; *TM 8-210.
Intestinal diseases	120	Familiarity with their nature; methods of spread and control; the students to learn how to apply all control measures.	AR 40-225 and 40-2250; *FM 21-10; *TM 8-210.
Insect-borne diseases	95	Familiarity with their nature; methods of spread and control; students to learn how to collect and recognize the insects concerned and how control measures are applied.	AR 40-230; *FM 21-10; *TM 8-210.
Venereal diseases	20	Familiarity with operation of control measures.	AR 40-235; *FM 21-10; *TM 8-210.
Micellaneous diseases	15	The nature, methods of spread, and control of these diseases.	AR 40-240; *FM 21-10; *TM 8-210.
Sanitary surveys and reports	28	Students to learn how to render intelligent assistance in conduct of sanitary surveys and preparation of sanitary reports.	AR 40-270, 40-275, 40-310, and 40-1080; *TM 8-210; *FM 8-40 and 21-10.
Vital statistics	10	Students to learn to keep statistical records, and prepare simple charts and graphs of same.	AR 40-270 and 40-275.
Applicatory work in sanitary devices and appliances	90	The student to become familiar with the instruments and tools used, the care of tools, the laying out and execution of work done in the buildings and maintenance of sanitary appliances.	*FM 21-10.
Total	528		

*See paragraph 3c.

SURGICAL

Training qualifications

a. Junior surgical technician, 5th class.

- (1) Qualified to perform the work of a junior medical technician as applied to surgical ward; or
- (2) Competent to act as junior assistant in the dressing or operating room or in a surgical clinic.

b. Surgical technician, 4th class.

- (1) Qualified to perform the work of a medical technician as applied to surgical ward; or
- (2) Qualified as in *a* above and competent to:
 - (a) Act as an assistant in the dressing or operating room or surgical clinic.
 - (b) Prepare patients for operation.
 - (c) Take charge of the preparation and maintenance of records in surgical clinics.

c. Senior surgical technician, 3d class.

- (1) Qualified to perform the work of a senior medical technician as applied to surgical wards; or
- (2) Qualified as in *b* above and competent to:
 - (a) Administer routine treatments in genito-urinary diseases under the direction of a medical officer; or
 - (b) Take charge, under supervision, of an operating room and care of the equipment; or
 - (c) Make or modify braces, and leather or other orthopedic appliances; or
 - (d) Take charge of the sterilization of all instruments and dressings in an operating room or surgical clinic.

d. Expert surgical technician, 2d class.

- (1) Qualified as in *c* above.
- (2) Competent, under a medical officer, to take charge of a dressing or operating room or a surgical clinic in a large hospital and administer routine treatments.

e. Master surgical technician, 1st class.

Qualified as a master medical technician as applied to the surgical service of a large Army hospital.

SCOPE OF INSTRUCTION AND TEXT REFERENCES

Subject	No. hours	Scope of instruction (minimum standards to be reached)	Text reference
Ward Management	20	Ward management. Requisition and care of ward supplies. The proper administration of enemas. Bathing of patients. Bed making. Proficiency in taking temperature, pulse, and respiratory rate.	*TM 8-220 and 8-230; Principle of nursing, Horner.
Anatomy and Physiology	10	Gross anatomy, with sufficient knowledge to locate and grossly identify the organs, bones, and principal structures of body and their functions.	*TM 8-220 and 8-230; Gray's Anatomy.
Operating room technique	120	The cleanliness and sanitation of operating room and equipment. Care, preservation, procurement and maintenance of instruments and equipment. Preparation of linen for sterilization. Structure and mechanism of sterilizers. The sterilization of linen and instruments. Anesthesia—methods of administration, preparation, and care of patients. Antisepsis and asepsis as applied in preparation of patients, surgeon, and assistants and as carried out during operative procedures.	Operating room procedures for nurses and internes—Falk, Henry C.; *TM 8-230.
Genito-urinary	110	The importance of venereal disease among armed forces and its prophylaxis. The care of special instruments and equipment. The technique of irrigations of genital tract. Technique of intravenous therapy for diagnosis and treatment. Catheterization. Nursing care of injuries, emergencies, and post-operative cases.	Urology of Nursing, David M. Davis, Modern Clinical Syphilology—Stokes. *TM 8-230.
Ear, nose, and throat	18	Ability to perform hearing tests; voice, watch and audiometer; irrigation of the external auditory canal in otitis media and external care of special E. N. T. instruments; preparation of special dressings used in E. N. T. surgery. Recognition of acute inflammatory diseases of ear.	Diseases of the Ear, Nose, and Throat—Ballenger; *TM 8-230.
Eye	12	Ability to perform determination of vision, field of vision, color vision. Methods of hot and cold compresses and special dressings used in eye surgery. Removal of foreign bodies.	Diseases of the Eye—Mav; *TM 8-230.

*See paragraph 3c.

SCOPE OF INSTRUCTION AND TEXT REFERENCES (Continued)

Subject	No. hours	Scope of instruction (minimum standards to be reached)	Text reference
Dental	24	Ability to instruct patients in oral hygiene, to administer dental prophylaxis and to recognize and give emergency treatment in common dental pathological conditions.	Mouth Hygiene-Fones. Special Dental Pathology—Black; *TM 8-230.
Orthopedics	120	The form, structure, and function of bones, joints, and muscle. The etiology and type of fractures. Bone healing and complications of fractures. Dislocations and sprains. First-aid treatment of fractures including treatment of shock, immobilization, and preparation for transportation. The types of splints, their uses and application. Plaster of Paris: its preparation and application as splint or cast. Suspension traction—structure of Balkan frame Principles and application of traction. Special nursing care of fracture cases, including the prevention and care of complications.	*FM 8-50; *TM 8-220 and 8-230.
Septic surgery	30	An understanding of what is meant by infection. The causes and character of wound infection. Bacteriology of wound infections as determined by laboratory methods. Prevention and treatment of infections; Dakinization, debridement. Methods of drainage. The prevention of gas infections and tetanus.	Any standard text on general surgery; Medical History of World War. *TM 8-220 and 8-230.
General surgery	64	In addition to knowledge of special subjects outlined above the student should understand the care, treatment, and transportation of injuries involving other anatomical areas; head injuries, chest injuries, and injuries to the abdominal viscera, particularly their emergency treatment preparation for transportation, recognition of those cases not fit for transportation and the necessity for rapid transportation when indicated. The ability to act as a surgical assistant when necessary.	Medical History of World War; Any standard text on general surgery; *TM 8-230.

*See paragraph 3c.

X-RAY

Training qualifications

a. Junior X-ray technician, 5th class.

- (1) Preparation of chemicals and processing of films.
- (2) Maintaining the register and filing records.
- (3) Taking of dictation of scientific phraseologies in connection with radiography and X-ray therapy.
- (4) Scientific positioning of patients and manipulation of X-ray machines.
- (5) Assisting with fluoroscopy.
- (6) Assisting with therapy machines.

b. X-ray technician, 4th class.

- (1) Qualifications required of junior X-ray technicians (a above).
- (2) A certificate of graduation from the course for enlisted X-ray technicians, Army Medical School, or its equivalent in training or experience in X-ray work either in the Army or in civilian institutions.
- (3) Proficiency in the following:
 - (a) The minor repair of X-ray equipment.
 - (b) The practical application of osteology and fundamental X-ray physics.

c. Senior X-ray technician 3d class.

- (1) Qualifications required of the X-ray technician (b above).
- (2) Special ability in:
 - (a) Radiological or X-ray therapy procedures.
 - (b) Repair of X-ray equipment.
- (3) The testing and calibration of radiographic therapy machines.

d. Expert X-ray technician, 2d class.

- (1) Qualifications required of the senior X-ray technician (c above).
- (2) Expert ability in:
 - (a) Installation, maintenance, and ordering of X-ray supplies and equipment.
 - (b) Maintaining X-ray therapy records.

e. Master X-ray technician, 1st class.

- (1) Qualifications required of the expert X-ray technician (d above).

(2) Expert ability as demonstrated by long and excellent service in the lower classes in:

(a) The technique and procedure of all phases of radiology.

(b) The maintenance and operation of special equipment.

SCOPE OF INSTRUCTION AND TEXT REFERENCES

Subject	No. hours	Scope of instruction (minimum standards to be reached)	Text reference
X-ray	60	Theoretical and practical.	AR 615-20; Physics of Radiology, Weatherwax, 1931; Practice of electricity, Croft, 1930; AMS Manual No. 164, 1935; *TM 8-240 and 8-275.
Writing diagrams	90	Maintenance and repair of X-ray and accessory equipment.	AMS Manual No. 164, 1935; practice of Electricity, Croft, 1930; *TM 8-240 and 8-275.
Films, X-ray	60	Film factors and processing.	Eastman Laboratory Manual, 1st Ed., 1934; *TM 8-240.
Films, X-ray	14	Handling and filing.	Eastman Laboratory Manual, 1st Ed., 1934; *TM 8-240.
Anatomy	60	Roentgen and surface anatomy.	Gray's Anatomy, 22d Edition, 1930; *TM 8-240.
X-ray units	167	Positioning and manipulation of.	AMS Manual No. 164, 1935; Roentgenographic Technique, 1st Ed., Moore and DeLorimer, 1934; Roentgenographic Technique, Rhinehard, 1930; X-ray Studies, Advanced, General Electric Company, 1931; *TM 8-240 and 8-275.
Fluoroscopy	18	Preparation of patients and routine handling of.	AMS Manual No. 164, 1935; *TM 8-240 and 8-275.
Localization of foreign bodies	12	Double exposure method and Strohl wire.	AMS Manual No. 164, 1935; U. S. Army X-ray Manual, 2d Ed., 1931; TM 8-275.
Property	14	Medical Department property.	AR 40-1705.
Review	10	Review of past subjects.	
Examinations	20	Weekly examinations on subjects of past week.	AMS Manual No. 162; *TM 8-275.
Additional	13	Added instruction where indicated.	AMS Manual No. 162; *TM 8-240 and 8-275.
Total hours	528		

*See paragraph 3c.

VETERINARY

MEDICAL

*Training qualifications**a. Junior medical technician, veterinary, 5th class.*

Competent to:

- (1) Take temperature, pulse, and respiration.
- (2) Cleanse and disinfect ordinary dispensary equipment.
- (3) Care for and maintain ordinary veterinary ward property and equipment.
- (4) Prepare and feed special rations.
- (5) Administer medicines orally, apply bandages, give enemas, and employ simple methods of restraint.

b. Medical technician, veterinary, 4th class.

- (1) Qualified as in *a* above and competent to:

- (a) Act as a practical animal nurse.

- (b) Prepare and maintain clinical records.

- (c) Act as an assistant in charge of a medical or communicable disease ward, including feeding and shoeing of patients.

- (d) Detect defects in the fitting and adjusting of equipment including the Phillips' pack saddle.

- (2) Practical knowledge of the dosage and administration of drugs and of elementary therapeutics.

- (3) Knowledge of the principles of disinfection and isolation, and methods for elimination of flies and other common insects.

c. Senior medical technician, veterinary, 3d class.

- (1) Qualified as in *b* above and competent to:

- (a) Administer hypodermic medications and to pass the stomach tube.

- (b) Compound simple preparations commonly used in veterinary medicine.

- (2) Graduate, enlisted technicians' course, Army Medical School or Army Veterinary School or its equivalent in either civil or military experience.

*d. Expert medical technician, veterinary, 2d class.*Qualified as in *c* above and competent to:

- (1) Maintain all veterinary records pertaining to sick and wounded animals.

- (2) Supervise and train technicians in lower grades in the performance of their duties.

- (3) Dispense stock drug preparations and compound ordinary veterinary prescriptions and properly keep the records.

- (4) Take charge, under general supervision of the handling of communicable diseases, quarantines and disinfections including dipping vats, stock cars, and corrals.

e. Master medical technician, veterinary, 1st class.

- (1) Highly qualified as in *d* above and competent to take charge, under general supervision, of a pharmacy, or pharmacy stock room, disposing of stock and keeping records.

- (2) Qualified to assist or perform under supervision specialized veterinary medical procedures.

VETERINARY

SURGICAL

*Training qualifications**a. Junior surgical technician, veterinary, 5th class.*

- (1) Qualified to perform the work of a junior medical technician, veterinary, as applied to surgical wards; or

- (2) Competent to act as junior assistant in the dressing or operating room or in a surgical ward.

b. Surgical technician, veterinary, 4th class.

- (1) Qualified to perform the work of a medical technician, veterinary, as applied to a surgical ward; or

- (2) Qualified as in *a* above and competent to:

- (a) Act as an assistant in the dressing or operating room or surgical clinic.

- (b) Prepare operating room and instruments and, with assistance, place an animal on an operating table.

- (c) Take charge of the preparation and maintenance of records in a surgical clinic.

- (d) Take charge of the sterilization of all instruments and dressings in operating room or surgical clinic.

- (3) Knowledge of elementary anatomy and physiology.

c. Senior surgical technician, veterinary, 3d class.

- (1) Qualified to perform the work of a senior medical technician, veterinary, as applied to surgical wards; or

- (2) Qualified as in *b* above and knowledge of pharmaceutical arithmetic sufficient for routine dispensing of stock drug preparations for use on the wards and for properly keeping the records.

d. Expert surgical technician, veterinary, 2d class.

- (1) Qualified to perform the work of an expert medical technician, veterinary, as applied to surgical wards; or

- (2) Qualified as in *c* above and competent to:

(a) Apply special bandages and appliances; do simple suturing of wounds and prepare fields of operations.

(b) Supervise and train technicians in lower grades in the performance of their duties.

e. Master surgical technician, veterinary, 1st class.

(1) Qualified as a master medical technician, veterinary, as applied to the surgical ward of a veterinary general hospital.

(2) Qualified as in *d* above and competent to administer general anesthetics to large animals.

VETERINARY

MEATS AND DAIRY HYGIENISTS

Training qualifications

a. Junior hygienist, meat and dairy, 5th class.

(1) Capable of:

(a) Making routine inspections of meats, meat food and dairy products, under direct supervision.

(b) Preparing routine records and reports of inspections.

(c) Selection, preparing, and proper packing specimens of meats, food and dairy products for shipment to food analysis laboratories.

(2) Knowledge of the sanitary requirements of personnel, store rooms, inspection rooms, docks, and trucks used in the storage and handling of food.

b. Hygienist, meat and dairy, 4th class.

(1) Qualifications of junior hygienist, meat and dairy, in *a* above.

(2) Capable of:

(a) Making routine inspections, under general supervision, of meat, meat food and dairy products at purchase, in storage, and at issue.

(b) Interpreting Federal Specifications and Army Regulations pertaining to meat and dairy products.

(3) Knowledge of the requirements of sanitation, temperatures, and ventilation of storage rooms and basic understanding of the methods of curing, canning and processing of meats and the manufacture of dairy products.

c. Senior hygienist, meat and dairy, 3d class.

(1) Qualifications of hygienist, meat and dairy, *b* above.

(2) Graduate of the enlisted technicians' course, Army Veterinary School, or its equivalent in either civil or military experience.

(3) Competent to make inspections, under supervision, of methods of curing, canning, and processing meats and the manufacture of dairy products, and to evaluate the standards of sanitation maintained.

(4) Able to:

(a) Instruct hygienists, meat and dairy, in lower grades and to supervise the inspection made by his assistants.

(b) Prepare and keep all records necessary in the office of a depot or port veterinarian.

d. Expert hygienist, meat and dairy, 2d class.

(1) Qualifications of senior hygienist, meat and dairy, in *c* above.

(2) Competent to:

(a) Make the inspection, under general supervision, of the methods used in curing, canning, freezing, selecting, and grading of meats and meat food products, and the manufacture of dairy products; and in the sanitary requirements of establishments including milk plants and dairies.

(b) Make the inspection, under general supervision, of poultry, eggs, and fish.

(c) Instruct subordinate technicians.

e. Master hygienist, meat and dairy, 1st class.

(1) Qualifications of expert hygienist, meat and dairy, in *d* above.

(2) Expert inspector of food and dairy products as demonstrated during long and excellent service.

SCOPE OF INSTRUCTION AND TEXT REFERENCE, VETERINARY TECHNICIANS

Subject	No. hours	Scope of instruction (minimum standards to be reached)	Text reference
Veterinary hygiene	46	Veterinary station service. Veterinary service in the theater of operations. Scheme of evacuation. Veterinary reports, returns, and records. Stable construction, hygiene, and ventilation. Quarantine and isolation. Dipping and dipping vats. Stable management. Conditioning of animals. Fitting and care of equipment. Conditioning and care of animals on march and in field. Forage, composition of feeds, feeding factors, food values, and watering. Dressing teeth. Aging of animals. Classifications and specifications—branding and registration of public animals.	AR 30-440, 30-445, 40-203 and 40-2195 to 40-2270, inclusive; Medical Bulletin No. 19; Medical Bulletin Technical Information for Enlisted Personnel of the Veterinary Service; FM 25-5; *TM 8-238.
Veterinary anatomy	22	Anatomy of the skeleton. Muscles, ligaments, tendons, and joints. The digestive, respiratory, urogenital, circulatory, and lymphatic systems. Pulse and temperature. The special senses. Nervous system. The eye, ear, nose, and skin.	FM 25-5.
First aid—animal nursing, including minor surgery	30	Diseases and common injuries of the muscles, tendons, ligaments, and joints. Diseases of the digestive, respiratory, urogenital, circulatory, lymphatic, and nervous systems. Diseases of the eye, ear, nose, and skin. Diseases of the foot, the bone, and lameness. Wounds, their control and treatment; control of hemorrhage. Animal nursing. First aid. Operating room technique and post-operative care.	Medical Bulletin. Technical information for Enlisted Personnel of the Veterinary Service; *TM 8-238
Veterinary bacteriology	39	Preparation and shipping of specimens. Bacteria, distribution, nature, and classification. Sterilization methods. Preparation of culture media. Pathogenic bacteria; morphology. Identification of bacteria. Staining methods. Artificial cultivation. Amoebic and anerobic bacteria. Bacteriology of milk and water. Infection, immunity, and allergy.	Manual of Veterinary Bacteriology, Kelsor; AR 40-2145; *TM 8-238.
Materia medica, Therapeutics, and pharmacy	28	General therapeutics. Recognition of poisons. Dosage and administration. Specific action. Metrology and prescription writing. Pharmaceutical processes and pharmacy management.	Medical Bulletin. Technical Information for Enlisted Personnel for the Veterinary Service; *TM 8-238.
Horseshoeing	8	Practical horseshoeing and shoeing defects.	*FM 25-5; *TM 8-240.
Roentgenology	61	Elementary electricity and physics. X-ray apparatus and safety factors. Films and developers. Positioning and restraint. Practice exposures. Fluoroscopy.	U. S. Army X-ray Manual; *TM 8-240 and 8-275.
Procurement and inspection of hay, straw, and grain	135	Practical laboratory analysis of hay, straw, and grain. Analyzing and scoring timothy, alfalfa, clover, Johnson, prairie, and grain hays. Grades and classes of oats and corn. Storing and sampling of concentrates. Practical laboratory analysis of grains.	U. S. Standards for Hay and Straw. Hay Inspector's Manual; Official Grain Standards of the United States.
Meat and dairy hygiene	158	Understanding the sanitary requirements and interpretation of Federal Specifications relating to the procurement of meats, meat food, dairy and marine products. Sanitary inspection of establishments. Ante mortem, slaughter and post mortem. Sanitary inspection, classification and grading fresh meats, cured, smoked and canned meats, rendered products, sausages, poultry, eggs, fish and sea foods, butter, cheese and miscellaneous products.	Military Meat and Dairy Hygiene—Eakins; AR 40-2150 to 40-2230, inclusive, and 40-2260; *TM 8-238.

*See paragraph 3c.

CHAPTER VII

COMBAT ORDERS AND THE SOLUTION OF MEDICAL PROBLEMS

Introduction. Control of a military unit by its commander is exercised by means of orders. Capacity to announce sound tactical decisions and plans in the form of orders is an essential element in the art of troop leading. (See Chapter V, "Leadership," Part I.) The commander must depend upon subordinates for the execution of his orders. Hence, the subordinates must be informed of their tasks and missions in such clear and unmistakable terms that misunderstanding is unlikely. A Chinese proverb has it that "an order which can be misunderstood will be misunderstood." Battles have been lost by faulty orders just as they have been lost by faulty decisions. The officer who aspires for success in command of troops in battle or campaign (a noble aspiration) must acquire adeptness in this art. This chapter deals with the process by which the medical officer may reach sound decisions as to the accomplishment of his missions, and how he may translate his decision and plans into orders to carry them into execution.

The medical officer faces the problems of decision and of planning in the same degree and for the same reasons as his brother of the arms. If his assignment places him within the infantry or cavalry division he will exercise command of medical troops who will be organized into detachments which are attached to the subordinate units of the division, or he will be with the medical regiment, battalion, or squadron as the case may be. Whatever his assignment he must seek and obtain information about the proposed operation of the troops for which he is to provide medical service; he must analyze and estimate the situation which confronts him; he must arrive at a decision and make a plan for its execution; finally, he must transmit his decision and plan to the subordinates who are to execute it or assist him in its execution. It is a difficult task. Mistakes and omissions cannot always be quickly corrected or adjusted. Within the Army time-proven procedures have been developed as a guide in acquiring this necessary ability. But they must serve only as a guide because each situation in battle will present its own special requirements which may vary widely from preconceived notions. Medical officers must learn these essential troop-leading procedures in order that they may carry out their humanitarian missions with the smooth and certain execution which efficiency requires.

The Medical Mission. A specific mission for medical troops is rarely included in the orders issued by a commander incident to the conduct of battle or other military operations. In broad terms, this mission is continuous under all situations and requires that medical service including evacuation be provided in whatever trying circumstances may be presented. The medical officer must deduce the detailed requirements of his mission from the tactical situation and the nature of the proposed operations. This deduction, or analysis, can be expressed in precise terms, e. g., "To provide medical service for the division (regiment) in an attack by envelopment."

Surgeon's Recommendations, or Medical Plan. The division surgeon is a member of the division special staff, and the regimental surgeon is a member of the regimental staff. Staff officers receive early information of proposed operations either from the commander in person or from other staff officers who represent the commander. As the action progresses they receive further information through the same channels. In the usual case the division surgeon receives this information from G-4 in the form of extracts from the division commander's plan. Often this is all completed at a "G-1, G-4 Conference" which is attended by special staff officers who are concerned directly with providing service during the operation; for example, such a meeting would be attended by the division quartermaster, ordnance officer, military police officer or provost marshal, as well as the division surgeon. At this meeting information is given by G-1 and G-4 upon which plans of each special staff officer are based. During the discussion much preliminary coordination is arranged. The division surgeon would then be able to visualize the situation confronting him. After this initial conference he makes such reconnaissance as is necessary, confers with members of his organization, estimates the situation fully, and arrives at a tentative plan to carry out his mission; the latter may well include the issue of warning orders to enable his troops

to make advance preparations. When he has completed his tentative plan he would return to the commander or his representative, such as the G-4, and submit his recommendations. Frequently, this is done at a second "G-1, G-4 Conference" which is attended by the same group of special staff officers. The plans submitted by the several staff officers will be approved at this meeting, in the usual case, unless there is a change in the situation, or conflicts are disclosed between recommendations of staff officers, or that the plan recommended is not considered adequate to the requirements. In any event, the commander or his representative will either approve the recommendations in full, approve them with modifications, or disapprove them and direct further study. Coordination may be obtained between staff officers at this meeting. At the end of the meeting the surgeon should know exactly what his unit is to do and where and when it is to do it. This is the *medical plan* for the support of the commander's tactical operation. The decisions which are reached prior to making the recommendation are determined as a result of an estimate of the situation, as discussed below. This process is a responsibility of the surgeon in his capacity as a staff officer. For contents of the surgeon's recommendation see page 793.

THE ESTIMATE OF THE SITUATION

As soon as the surgeon has received information of the proposed operation at the first "G-1, G-4 Conference" he must make an estimate of the situation in which he considers all factors of his task in order that he may reach with greater certainty a logical decision and sound plan. In making this estimate he will often be obliged to make a ground reconnaissance of possible localities for his installations, confer with his staff and subordinate commanders, and perhaps obtain additional coordination with other special staff officers. Each situation will present special difficulties which, unless circumvented, may prevent the accomplishment of the mission. The commander, or surgeon, makes the estimate in order to accomplish his ends *despite enemy interference or other obstacles*. By forcing himself to consider *all* the factors he makes quite certain that none are overlooked. The conclusion of the estimate must result in a decision, stated in concise and definite terms, of the *best* medical plan to support the forthcoming tactical operation.

The mechanics of making an estimate of the situation involves no more than the adoption of a logical process of thought. It is the negation of "snap" judgment. It is an attempt to insure consideration of all the factors. While it may not, in fact, produce in all cases the "best" solution, it should provide a "workable" solution, at the least, provided always that the officer making the estimate has the requisite training and exercises sound judgment. In its application it may be oral or written, brief or lengthy, completed in a brief period or require considerable time for its completion. War plans for the defense of the nation against potential threats to our peace and safety, for example, are developed continuously and perhaps may never be said to be completed. It requires the ultimate degree of painstaking, time-consuming care. On the other hand, a commander in battle "lives" with the situation and attempts to foresee all of the hostile capabilities, and in the exercise of this foresight he devises tentative plans to meet them. Under these conditions a commander may announce his decision and plans with only momentary delay after the occurrence of an event which requires a decision. The time consumed to make the estimate may be said to "float" between these wide limits, but the commander of troops in battle will rarely have more than a bare minimum of time for this exclusive purpose. He must use foresight to gain the required time. Since Time is dominant in war the commander is faced continually with the two ever-conflicting requirements: *First*, a succession of sound decisions is necessary for success; *second*, the substance of his decisions and plans must reach the subordinate commanders in the form of orders in time to be applied.

There is no open road to the development of logical processes of thought. Educators have striven with the problem for centuries with results which they would not claim to be entirely adequate to the need. It is not a simple problem. The ability to reason, analyze, and decide must be present, or all mechanical aids will fail, however adequate or useful they may be in other hands. The form reproduced below for the use of medical officers in the solution of their own tactical problems is a guide, an aid, and experience indicates that it is a useful one. Its use in training to develop proficiency should serve to fix in the mind of the student a sequence of reasoning which may be followed with

confidence to arrive at a decision involving the use of medical means. It serves only to stress the important factors. It can be followed in any given situation only in so far as it is practicable. This form is prescribed for use by students at the Medical Field Service School.

FORM FOR A MEDICAL ESTIMATE OF THE SITUATION

1. MISSION.—State the mission assigned by higher authority or deduced from instructions from that source.

Note: The mission is the governing element in every plan. It must never be disregarded, never modified. While it is true that a medical mission invariably includes the provision of some phase, or phases of medical service, the adaptation of the medical service to tactical requirements is definitely a part of the medical mission. For example, a mission "to provide medical service for the division in a night withdrawal" imposes quite different limitations upon a medical plan than a mission "to provide primary medical service for the battalion in attack."

2. SITUATION.—

a. Elements of the situation.

(1) *Enemy capabilities.* List, under (a), (b) . . . (n), the capabilities of the enemy for influencing the medical problem through strength, position, weapons, casualty producing agents, air action and other similar means.

(2) *Own situation.*

(a) *Tactical plan.* State so much of the tactical plan of your commander as may influence the medical problem.

(b) *Strength.*

(c) *Position.* Discuss the strength of the position from the point of view of casualty expectation.

(d) *Movement.* The probable extent, direction and rate of movement of the whole force or any major component thereof.

(e) (f) (n). Any other elements in own situation that may affect the medical service.

Note: Tables of Organization give the authorized strength of units. In map problems, unless it is stated otherwise, or there are factors present which specifically require special computation of strength, it can be assumed that all units are at authorized war strength. The combat efficiency of our own troops has a definite bearing on the number of casualties to be expected. A determination of combat efficiency includes a consideration of physical condition, morale, training, battle experience and leadership.

(3) *Physical factors.*

(a) *Terrain.* List the terrain features that may influence the medical service either in the number of casualties or in their collection and evacuation.

(b) *Communications.* Consider the condition, availability, practicability and restrictions imposed by higher authority on roads, railroads, water routes, or other routes of communication as they affect the medical problem.

(c) *Weather.* Present and predicted weather, including moonlight if that be a factor in the medical problem.

(d), (e) (n). Other physical factors that should be considered.

b. Analysis of situation. Analyze the elements in sub-paragraph *a.* This should include a discussion of the probable enemy reaction to our scheme of maneuver and the final disposition and location of the forces as a result of the action.

Note: A thorough understanding of the mission of the command and knowledge of the decision of the force commander is essential in making a medical estimate. The purpose of considering the tactical plan first in the estimate is to establish early the tactical basis of the medical task to be accomplished. Sufficient information regarding the combat strength and disposition of the enemy is usually available to the end that his probable reaction in reference to time and to contemplated action can be deduced. Only by full consideration and complete understanding of the tactical maneuver in all of its phases can the requirements in terms of medical service be planned for and provided as the action ensues.

3. ESTIMATION OF CASUALTIES.—

a. Estimated number and probable distribution of casualties. Estimate and record by localities the approximate number and type of casualties to be expected. This is a product of the combined influences of relative strength, enemy capabilities, own scheme of maneuver, physical factors, morale and physical condition upon expectation shown in experience tables. (See Table X, Reference Data, MFSS, 1940, for casualty estimates for the particular type of action).

b. Areas of casualty density. From an analysis of the scheme of maneuver and the probable enemy reaction, locate approximately the areas where the greatest number of casualties can be expected, together with the approximate time of their incidence.

Note: In estimating the number and location of casualties all of the factors enumerated in paragraph 2 must be considered. Relative fire power and its effect upon casualty expectation, terrain features favoring the effectiveness of enemy fire, and the effect and its extent on the casualty rate that any special advantages of our own force will have in offsetting the effectiveness of enemy fire should be considered here. The greatest number of casualties will ordinarily occur in those areas where the main or decisive effort is made. The units making the decisive effort, together with the location where it will occur, are usually mentioned in map problems or can be deduced from a study of the scheme of maneuver. In the attack, these areas are extended into the hostile position. In all units a study of the terrain, coupled with the location of enemy weapons (including light artillery) is essential in locating areas where enemy fire will be most effective and will, therefore, produce the most casualties. These areas are known as *areas of casualty density*.

4. AVAILABLE MEDICAL MEANS.—

a. Organic medical means. State the current status of the available medical means and its capabilities for further effort. Consider the following factors: The numerical strength and composition of the means; the morale, physical condition and state of training; the condition of its equipment, including transportation; time and space factors in relation to its availability to the medical task.

b. Attached medical means. Consider the factors enumerated in sub-paragraph *a* of paragraph 4 above for all additional medical units attached for the operation.

c. Medical support. Evacuation and other medical support by higher echelons not under control of own unit.

d. Supply. Supply agencies and supplies now on hand, especially medical, and facilities for their replenishment.

5. PLANS.

a. Possible plans. Under (1), (2) (n), list all workable plans for a satisfactory medical service for the operation. Practicable plans should include plans that may require an augmentation of means for their operation. One or more basic plans may have variants that can be stated in sub-paragraphs of the paragraph giving the basic plan.

b. Analyses of plans. Determine the practicability and weigh the advantages and disadvantages of each plan listed in sub-paragraph *a* of paragraph 5. Do not discard a practicable plan requiring an augmentation of means until it is certain that no reinforcements will be available.

Note: In studying any situation, two or more possible medical plans will present themselves to the mind of the solver. In order to select the best plan, a comparison of their values through the process of weighing the advantages and disadvantages of each against all others must be made. These plans must not only be practicable from a medical standpoint but also must be acceptable tactically and logistically to the commander and his staff. It is not necessary or desirable to discuss the minute details of any plan. The basic factors should be stated and discussed. In the division these will usually be restricted to the use of collecting ambulance and clearing units or to the location of aid station sites; in the corps, to the location of clearing stations; and in the army, to the movement of and the location of evacuation and surgical hospitals and medical regiments. The simplicity and flexibility of any plan are always major and determining factors in considering its value. Medical doctrines, principles of employment of medical units, and time and space factors, are all important items to be considered in the study of each plan in this paragraph. The discussion of the various plans should be so complete and logical that the best plan will be by contrast and easy choice.

6. DECISION.—A statement in concise terms of the *best* medical plan.

Note: The decision should be the final result of the discussion in paragraph 5. The conclusion arrived at by this process of reasoning is analogous to the basic decision of a commander and should include *what, when, where* and *how* the task will be done. It forms the nucleus for the addition of any *supplemental* decisions necessary to complete the details of a complete medical plan. These supplemental decisions can often be made by the staff of the commander, if he so delegates authority. Situations will occur when, due to lack of information, all of the elements of what, when, where and how the task will be done cannot be supplied—when this occurs the estimate should terminate with a conclusion only as complete as the situation at the specified time warrants. The scope of the conclusion which is warranted by the situation must be determined in each case by the student.

Abbreviated Estimate of the Situation. When a decision must be reached rapidly, time will not be available for a complete written estimate of the situation. Nevertheless, it is imperative that the outline be followed mentally in the sequence described. Once an officer has schooled himself in the use of the complete form he will be able to select the most important considerations and arrive at a sound conclusion without a complete discussion or consideration of all the factors shown. A running estimate, constantly revised as events transpire, results in conclusions which are evolved element by element. The medical estimate will usually fall in this category in practice, as a planned medical service must be furnished a command continuously from the creation of the unit until its final dissolution.

THE UNIT PLAN

The basic plan for medical service is an essential part of the development of the estimate of the situation. Peculiar to the Medical Department and the other services, before orders for the employment of their units can be issued, those parts of their plans liable to interfere or clash with plans of the other services or the arms and those that will be of interest to the command as a whole are submitted in the form of recommendations, as previously discussed, to the commander or his representative for approval. The basic plan having been developed and the commander's approval received, a detailed medical plan, or unit plan, can be formulated for putting the basic plan into effect. It includes a statement of the task to be accomplished by the medical unit as a whole and the task or mission which is allotted to each major element of the organization. Therefore, the plan contains all the information that is usually contained in paragraphs 2, 3, 4, and 5 of a formal field order and is, in fact, the basis of the orders as actually issued, a subject which is discussed later in this chapter.

Preparation of the Unit Plan. The surgeon who has no staff must of necessity prepare all the details of his unit plan. When a staff is available, the surgeon ordinarily uses it in the development of the details of his plan. As soon as the commander of a medical regiment decides on a basic plan he should transmit that information to his staff. These officers working singly or together then begin formulating a tentative complete medical plan by completing all the necessary details. The finality of any plan depends upon the action of G-4 on the surgeon's recommendations. This action is usually forthcoming at the final G-4 conference. In the event such action modifies the original recommendations, the necessary changes in the plan can readily be made by the staff. Staff officers must be authorized sufficient authority to make supplemental decisions. For instance, the medical plan of the regimental commander might state that the medical regiment will support the division attack with one collecting company in support of each brigade. The S-3 (plans and training officer) may decide that one brigade zone of action is too wide to be serviced by one collecting station and will require the splitting of a collecting company to operate two smaller stations. By deciding this the staff officer is still carrying out the intent of the commander and is acting within his province and authority as a staff officer. The commander cannot be expected to handle personally the innumerable details which constantly beset each unit in combat. The principal reason surgeons of higher echelons are furnished a staff is to relieve them of the burden of these details, which if given full attention would divert them from their principal responsibility, which is the supervision of the operation of the unit medical service. The impression should not be gained that a long period of time

will elapse before orders for action can be issued. In instances where necessary, fragmentary orders will be issued as soon as parts of the plan are formulated and coordinated. Warning orders to subordinates should be issued early during the preparation of plans as this action saves time and will provide a general basis for the receipt of subsequent detailed orders. The ideal is that medical troops will never be delayed in accomplishing their part of the medical task by the absence of orders.

ORDERS

Purpose. Control of any military organization in battle or campaign is exercised through the medium of orders. An order is defined as the will of the commander conveyed to his subordinates. The contents of an order result, in principle, from the estimate of the situation which culminates in a decision and basic plan which, in turn, is followed by the development of a detailed plan. Hence, the "order" is merely the medium by which the contents of the detailed plan are communicated to the subordinates who will execute it. This does not mean that all orders are preceded by this complete process, since many orders involve supplementary or incidental instructions or mere administrative routine. It would be difficult to overemphasize the importance of clearly expressed, simply worded, grammatically sound phraseology. The novice in the art sometimes becomes unduly impressed with a need for "canned" language, or for the "telegraphic" style that omits, in order to obtain brevity, words which may be essential for understanding. The use of well-understood terms, of short, clear expressions, the avoidance of complex sentences, of brevity itself, are each important, but none are so important as clarity so that the subordinate who reads or hears the order will have little opportunity to misunderstand his mission. The subject is especially important to the medical officer on duty with troops in the field. He must be able to understand the orders which he will receive, and he must be able to issue the necessary orders to his own subordinates in the exercise of his command function. The state of training of subordinate commanders has a direct bearing upon the extent to which details of execution must be prescribed in orders; this important factor must be constantly considered. The ideal order is one that allows of no misunderstanding.

Classification. Orders may be divided into two general classes: *routine orders* and *combat orders*. Routine orders concern camp or garrison activities or administration. Combat orders are classified according to their form and special uses. The nature of the decision or plan of action and its application to the particular situation will determine the selection of the type best suited to the purpose. They are classified as follows:

- Letters of instruction.

- Field orders.

- Warning orders.

- Movement orders.

- Administrative orders.

Letters of instruction. Letters of instruction are issued by higher commanders, or the War Department, prescribing operations over large areas and for a considerable period of time. They deal with the broader phases of operations and are generally confined to stating the mission and the part each major unit is to play in its accomplishment. They are usually secret and the information contained is not for general distribution.

Field orders. Field orders are formal orders issued by a commander setting forth the military situation, the tactical mission and the plan of action decided upon, and such details as to the method of execution as will insure coordinated action by the whole command. They are designed to bring about a course of action, in accordance with the intention of the leader, which is suited to the particular situation and with the purpose of attaining full cooperation between all elements of the force. Familiarity with the form of field orders is important to the medical officer.

Warning orders. A warning order is a field order issued as a preliminary to an order which is to follow. Its object is to give advance information in order that subordinates can make timely arrangements to facilitate the carrying out of the order which is to follow. They may be complete written orders or more often they may be *fragmentary* in message

form. In the medical service, especially in the higher units, their use is extremely important to proper functioning, due to the initial location of units usually far to the rear of the combat forces and the relative immobility of the larger medical installations.

Movement orders. Movement orders are issued only by the corps and army. They direct movement of corps and army troops, such as evacuation hospitals.

Administrative orders. Administrative orders are used to announce to the command the administrative, supply, and evacuation details which are of interest to the command as a whole.

Preparation of Combat Orders. *Scope.* Combat orders announce the situation, state the purpose of the commander, and define the task that each next subordinate unit is to perform in the execution of this purpose. As combat orders are the expression of a fixed decision they must state definitely the end in view. Combat orders should not attempt to arrange matters too far in advance as this may lead to their recall and substitution. Such action lessens confidence in the commander, injures morale, and is apt to impose unnecessary hardships on the command. Combat orders of an army recite the decision of the commander and assign the task each corps or other subordinate unit is to perform in carrying out the decision. Similarly, combat orders of corps assign the tasks of divisions, those of the division the tasks of brigades. Combat orders of the medical regiment assign the tasks of the battalions and separate companies. Battalion orders assign tasks for the companies of the battalions. The orders of a battalion surgeon assign tasks to the various squads of the section or often to individuals.

Amount of detail. A complete order always contains three essential components: *the situation, the mission of the command, and instructions regarding execution.* The commander informs his subordinates, to the extent useful to them, of the situation of the enemy and friendly troops. The amount of detail in an order depends upon the composition, size, and training of the force, the time available, the situation, and on the personality of the one issuing it and of those who are to receive it. The larger the force the more general will be the order. An order for a small or untrained unit will require more detail. When the transmission of orders involves a considerable period of time during which the situation may change, detailed instructions are avoided in the order. The same rule applies when orders may have to be carried out under unforeseen circumstances. In such cases it is better to give general directions, stressing the object to be attained, but leave to subordinate commanders the choice of the means to be employed. For a march not in the presence of the enemy, all that need be given is the order of march, the route to be followed, and the time of starting. On the other hand, for an attack, it is usually necessary, in addition to the decision, to give the line of departure, the direction of attack, the zone of action, the mission of each combat unit, the axes of signal communication, and the command posts. The use of an operation map may save time in portraying these details. In warfare of movement there will not be time, except in the very unusual case, for division and the other smaller unit commanders to prepare and distribute the complete written field order, if the forward movement of the units into position is to be uninterrupted. It is often necessary for these orders to be issued in partial or fragmentary form. This need is more apparent in units of greater mobility than the infantry division, such as horse or mechanized cavalry, motorized units, and aviation. In such units issuance of orders in fragmentary form is normal. In the preparation of fragmentary orders the sequence and technique of the five paragraph complete written field order is followed as closely as practicable. They may be issued orally, dictated, or written, and whenever possible should be accompanied by, or consist of an operation map on which all possible details are shown. When fragmentary orders are issued verbally they should be confirmed as soon as possible by written orders.

Details of technique. (1) *Purpose.* Technique has only one object and that is to further the purpose of the combat order. It has no value or importance except as it accomplishes this object. It should never be degraded into a burden nor furnish an excuse for delay in the issuance of orders.

(2) *Time.* Details of time should be carefully stated. Dates are given by stating the day, month, and year (if necessary), thus: 1 Feb 40. In naming a night (including midnight)

both dates should be mentioned, thus: Night 1-2 February 40. To designate *noon* and *midnight* these words are written: Midnight 1-2 February 40. When orders are to be executed on a date and at an hour as yet undetermined, or concerning which secrecy is essential, the expressions *D day* and *H hour* are used to indicate that the date and hour of the operation are to be announced subsequently. For example: FO 44 states "*the division will attack on D day at H hour*". Subsequent orders then state "*reference FO 44: D day is 15 Jan; H hour is 5:30 AM.*" It is then clear that the operation ordered by FO 44 is to occur on the 15th of January, at 5:30 AM. When the operations of any element of the command are to commence at some time prior to D day or H hour, the time is indicated as *D day (or H hour) minus (or plus) so many days (hours or minutes)*.

(3) *Place*. Details of place should be stated in orders with extreme care and accuracy. Expressions depending upon the viewpoint of the observer, such as *right*, *left*, *in front of*, *behind*, *on this side*, *beyond*, and similar words and phrases are to be avoided, reference being made to points of the compass instead. The terms *right* and *left*, however, may be applied to individuals or bodies of troops, to boundaries of zones or sectors, or to the banks of a stream. In the latter case the observer is supposed to be facing downstream; in the other cases he is supposed to be facing the front (direction of the enemy). In all cases where these terms are used, the compass direction should be inserted in parentheses immediately following the word *right* or *left*, thus:

Right (east) boundary.

The hostile left (north) flank.

Geographic names are written or printed in capital letters. This minimizes the chance of error and makes the places mentioned stand out prominently in an order. There is one exception to this in the naming of maps in the heading of field orders. The spelling in the order is the same as on the map used. When spelling does not conform to the pronunciations, the latter is shown phonetically in parentheses, thus: BICESTER (Bister), GILA (Hila).

All topographical features and places, except towns whose names appear in capital letters on the map, will be identified by coordinates each time they appear in a different subparagraph of an order when the maps used are provided with grid lines, or by reference to prominent nearby points when the map is not gridded. When coordinates are used, geographical features or places *named or numbered* on the map may be identified (except when a considerable space between grid lines, or poor legibility of the map, make identification difficult) by giving the coordinates of the south-west corner of the grid square in which they are located; those *unnamed* and *unnumbered* will be identified by giving the actual coordinates thereof, sufficiently close (according to the scale of the map) that they can be definitely identified.

A road is designated by its name, as the BALTIMORE TURNPIKE, or by connecting two or more names of places on the road with dashes, thus: the road: EMMITSBURG—FAIRFIELD—CASHTOWN.

Areas are designated by naming the points inclosing them, counterclockwise, beginning with the point on the right front from the point of view of one's own troops.

Lines parallel (or nearly parallel) to the front and lines perpendicular (or nearly perpendicular) (boundary between units) to the front are designated by naming points thereon in succession from right to left and rear to front respectively, from the point of view of one's own troops. In designating a boundary between units it is necessary to specify to which unit each point named on the boundary belongs. This is done in the case of zones of action or sector boundaries by placing the word *exclusive* or *inclusive* after the terrain features named, and in the case of boundaries between units by placing in parentheses after the terrain features named the designation of the unit to which they are assigned. For example:

Division zone of action:

East (right) boundary: TWO TAVERNS—M. FINK—RJ at (361.7-849.9)—NEWCHESTER (all incl).

West (left) boundary: WHITE RUN (excl)—GRANITE HILL (incl)—knoll at (359.8-754.2) (excl)—OAK GROVE S. H. (incl).

Boundary between brigades: LOW DUTCH ROAD (to 2d Brig)—GULDENS (to 1st Brig)—PINE CHURCH (to 1st Brig).

(4) *Designation of units.* The numerical designation of an army is written in full, as: *First Army*; of a corps in Roman numerals, as: *II Corps*; of a division or smaller unit in Arabic numerals, as: *1st Division, 3d Brigade, 1st Medical Regiment.*

(5) *Legibility.* Written orders should be so plainly written as to be legible even in bad light. It must be envisioned that the reader may have but a candle or flashlight by which to read. Carbon and mimeographed copies should be checked before issue for legibility and correctness.

(6) *Language.* An order is faulty if it does not convey to the recipient the exact meaning and intention of the author. Exactitude of language is necessary, and consequently care in the choice of words is required. Vague and ambiguous orders indicate vacillation and the absence of definite decision on the part of a commander. Troops must be told in terms that are direct and unmistakable exactly what their leader wants them to do. Combat orders should be brief but clarity should not be sacrificed to obtain brevity. Short and terse sentences are easily understood and therefore are preferable to long involved ones. Conciseness, brevity, and the use of plain English are paramount considerations. Conjectures, expectations, reasons for measures adopted, and detailed instructions for a variety of possible events must be avoided as they weaken the force of an order and undermine confidence in the commander. The affirmative form of expression should be used, e. g., "*The Headquarters and Service Company will remain in GETTYSBURG*" is better than "*The Headquarters and Service Company will not accompany the regiment*", because in the latter the gist of the order depends on the word "not". Such expressions as *attempt to care for, try to reach, as far as possible, if possible, as well as you can* should be avoided. They tend to shift the responsibility for the decision to the subordinate, which is incompatible with command. In combat orders technical military language should be used only when there will be no doubt that all subordinate officers have the training and experience to comprehend it. This applies to the use of the so called "canned language". Most of these technical terms can be clearly expressed in words of common understanding although a few more words may be necessary.

(7) *Abbreviations.* The purpose of using abbreviations is to save time, therefore they should be used when this purpose is served and not otherwise. An abbreviation once used in an order should be used throughout. The meaning of some abbreviations is reasonably plain at sight and these may usually be used—for example: *Adv Gd, Arty Brig, Comdg, Inf, Regt, Coll Sta.* The following should be used in writing orders :

AM and PM for periods of the day before and after noon.

RJ for road junction.

No for number.

CR for cross roads.

BM for benchmark.

incl for inclusive.

excl for exclusive.

Other abbreviations may be used providing they are authorized. See *Staff Officers' Field Manual*, Part One, Staff Data, AR 850-150. The use of abbreviations is not mandatory, except in listing annexes and in the distribution in the ending of orders. Periods are not used in writing abbreviations.

Field Orders. General. Every order issued for the purpose of governing the action of troops in the field in connection with a tactical situation is a field order. Field orders set forth the situation, the decision and general plan of action, and the tasks of subordinate units in such detail as will insure the proper operation of these units and coordination with the command. A field order may contain complete detailed instructions to a unit, or simply a statement of the task assigned, leaving to the initiative and resourcefulness of the subordinate the method of execution. While there is no fixed line of demarcation between these two methods of giving instructions, they are, for convenience, called *detailed field orders* and *mission field orders*. A *detailed field order* contains definite detailed instructions

to an element or all elements of a command. A *mission field order* is one in which an element or certain elements are simply given their individual tasks in general terms, together with the means for accomplishing these tasks. Their use is limited usually to cases where units are detached from the main force or under conditions which can only be adequately analyzed and the detailed measures of execution prescribed by the commander immediately present, such as in a pursuit. They follow the same sequence as the detailed field order and may be issued orally, dictated, or written. The medical regiment occasionally will find need for this type of order when it detaches part of its strength to accompany elements of the division in pursuits and on similar missions necessitating a major division of the combat force.

A prescribed form for field orders was adopted to provide a uniform practice of issuing orders throughout the service, to insure that the plan of the commander is readily understood, and, in addition, that all essential instructions are included and to facilitate reference. If every commander who issued a field order should follow a form of his own choosing, no two of these forms would be the same. Confusion and misunderstanding would result and essentials would be overlooked. A standardized form is necessary in order that those receiving it may know exactly where to look for pertinent information and instructions. The current form for a field order has been developed as a result of experience and furnishes a clear and natural sequence of issuing instructions.

All field orders have the same fundamental characteristics, namely:

(a) A concise word picture of the situation limited to information of the enemy and friendly troops, only to the extent that this information affects the subordinates.

(b) A definite, clear-cut, brief decision and plan for the command as a whole.

(c) Instructions for each subordinate element of the command stated in such a way as to insure teamwork and unity of effort by the whole command.

(d) Instructions governing the administration and supply of the command in the particular operation involved.

(e) Definite arrangement for communication between the commander and subordinates and between subordinate commanders.

Preparation. (1) The art of preparing a concise and understandable field order cannot be acquired over night. The development of proficiency is slow and requires painstaking work, through the medium of practice. Officers should take advantage of every opportunity in peace time to express tactical decisions in the form of field orders, and these efforts should be closely criticized. The degree of clearness with which orders will be issued on the field of battle, where conditions will certainly affect adversely the mental acuity of the commander, will be in direct proportion to the proficiency attained in the art through prior training and practice.

(2) Some officers may issue orders from a map after a short period of study. However, until that state of proficiency in the art is attained, the preparation of a field order should consist of the following steps:

(a) The planning of the operation on a map.

(b) The blocking out on paper of the various paragraphs in standard sequence and the noting in each of the information or instructions to be given.

(c) A thorough check of the draft to insure that an essential has not been omitted.

(d) Writing the order with all details arranged in proper order.

(e) Final examination for completeness and clarity.

Methods of issue. (1) The commander (having evolved a plan of operation) must select the method to be used in issuing the field order. Depending upon how quickly the action must be initiated, the order will be issued orally, dictated, or written and in fragmentary or complete form. In general, the field orders of armies, corps, and divisions are written; in open warfare those of the division, brigades, and regiments are fragmentary and either written or dictated, and those of lower units are dictated or given orally. The method of issue is a matter for determination by the commander in each case. The invariable rule is that the order must reach the lowest subordinate concerned in its execution in sufficient time to afford him a suitable opportunity to make his own reconnaissance plans, and to

issue his own orders prior to the hour set for the beginning of the action. Experience in the World War demonstrated that:

(a) Under favorable conditions, the minimum time for formal *written* field orders to reach the lowest unit concerned was:

For a division	6 hours.
For a brigade	3 hours.
For a regiment	1½ hours.

This is computed from the hour the order was ready for distribution. It included the time required for the commanders and staffs at each subordinate headquarters to read and digest the order and to prepare their own orders.

(b) It will require an average of 15 minutes to issue a complete order verbally to a regiment or battalion. The time necessary to put into operation an infantry regimental order under the most favorable circumstances may be approximated as follows:

For the battalion commander's reconnaissance, formulation of his plan, and preparation of his verbal order	20 minutes
For the issue of the verbal order	15 minutes
For the company commander's reconnaissance	10 minutes
For the issue of the company commander's order and for reconnaissance by platoon leaders and issuance of their orders	15 minutes
For the deployment of the companies	15 minutes
Total	1 hour, 15 minutes

Roughly 1½ hours can be assumed as the time required in the average case. Thus, the battalion surgeon, having heard the oral order of the battalion commander, will have about 50 minutes for reconnaissance, the issuance of his orders, and for getting his section into position.

While these figures are generally accepted as correct as based on World War experience the wide use of radio, especially two-way voice radio, reduces the time required for the mechanical transmission of messages and orders. Further, post-war developments have tended to place greater emphasis on oral or dictated orders rather than the habitual use of formal written field orders.

(2) Complete written field orders have the advantages of being accurate, of giving complete information, and of lessening the chances of misunderstanding. When the commander decides to issue fragmentary orders to initiate action these fragmentary orders are assembled into complete written field orders at the earliest opportunity and every effort made to have them available to subordinates prior to the beginning of the action. Regardless of whether the complete written field order can be issued or not prior to the action, it is formulated and issued without delay for purposes of record.

Fragmentary field orders. (1) In warfare of movement it will be unusual for divisions and smaller units to issue complete written field orders to initiate action. The tactical requirement in moving situations, that the forward movement of troops into combat be continuous, demands that orders be issued in fragmentary form. In units having greater mobility than infantry the issuance of fragmentary orders is normal and usual.

(2) Fragmentary orders are prepared following the same sequence and technique prescribed for the written field order as permitted by the information and instructions to be furnished the subordinate. If it is desired to insure instructions which are contained only in paragraphs 2, 3, and 5 of a complete written field order, they are arranged in that sequence, and paragraphs 1 and 4 are omitted.

(3) Fragmentary orders may be issued orally, dictated, or written and whenever possible should be accompanied by an operations map. They may be transmitted by means of messengers, telephone, radio, or other method. When issued other than written they should be followed as soon as possible by a written confirmation. When time and space factors permit, officers are used invariably for the delivery of fragmentary field orders to insure accuracy and reliable transmission.

Oral and dictated field orders. (1) Oral and dictated orders are similar in that both are spoken orders. Oral orders are not taken down verbatim, but notes are taken. The

method of issue rests with the commander. He may say, "Copy this order," meaning a dictated order; or he may say "Take notes," meaning an oral order.

(2) The greatest advantage of oral orders is the short time required for their issuance, and they have their particular application in rapidly changing situations. When an oral order is issued, a record is made of its provisions by the commander issuing it and by the subordinates receiving it for inclusion in the journals of their own units. When important orders are issued orally by a commander he furnishes to each subordinate receiving it a copy of the entry made in his own journal pertaining to the order.

(3) The dictated order is taken down verbatim. It then becomes a permanent, ready reference for later use, and the chances of error due to forgetfulness or misunderstanding are much less than in the case of oral orders. When time does not permit of the issue of the complete written field order, yet does admit of the use of this type, the dictated order should always be used in preference to the oral field order.

(4) The prescribed sequence of field orders must be adhered to strictly in issuing oral and dictated field orders. The written order can be modified or otherwise corrected before issue. But the moment a commander changes his instructions during the course of a dictated or oral field order he creates confusion and misunderstanding, and arouses in his subordinates a lack of confidence in him as a commander by his apparent indecision and vagueness. In issuing dictated field orders the commander does not indicate where one paragraph begins and ends, but the subordinate writing the orders should do so. Subordinates are not responsible for words put into orders. They are responsible, however, that they carry away a clear copy. This implies suitable paragraphing, punctuation, correct spelling, and legible handwriting. The copy must be intelligible to others.

(5) The formulation of a field order which is to be issued orally or dictated is a delicate task requiring meticulous care for the best results. Before dictating an order or issuing one orally the commander must have his plan thoroughly crystallized. He should block out on paper the various headings and paragraphs of the order, noting the instructions to be given each subordinate unit. There are three methods possible of use in formulating and issuing oral and dictated field orders. The commander may write out the order in full and then read it to his subordinates; he may prepare notes and select the words of the order as he issues it; or he may issue it without notes. The first method is safest but can rarely be used due to lack of time. The second method is safe and the one most often used. The third method is a poor one and only mentioned to be condemned. Subordinates taking dictation should not be forced to erase, substitute, interline, or alter what they have already written. They have plenty of writing to do, and time and labor should not be increased as the result of insufficient and improper preparation or faulty dictation.

(6) Oral and dictated orders may be issued from an observation point where points and areas on the terrain in reference to similar places on the map and the contemplated action can be used to orient the subordinate. Orientation between the map and the terrain must be completely understood by all, especially if the order is couched in terms referring to points on the map. The pointing out of features on the terrain during the issuance of dictated field orders is good practice only when it is assured that the subordinate receiving that part of the order is not busy writing at the time. In issuing instructions to subordinate units, the official title of the organization or its commander should be used rather than the appellation "You." While there is more room for explanation to subordinates in the oral type of field order the need for explanation shows a lack of preparation either on the part of the commander or the receiver.

Complete written field orders. The form for the complete written field order prescribed for use throughout the service is divided into the following sections, each of which contains a certain assigned class of information or instructions.

The heading.

The distribution of troops (only in certain orders).

The body.

The ending.

(1) *Heading.* The heading contains the *title*, the *place*, *date*, and *hour* of issue; the number of the order; and reference to the map used.

(a) *Title.* The title appears in the upper right hand corner of the first page. It is the official designation of the command; as, 1st Medical Regiment. It may, where circumstances require, be shown as a code name.

(b) *Place of issue.* Appears in the same corner and on the line next below the title. Because of the need for secrecy, it may be desirable at times to omit the place of issue.

(c) *Date and hour.* The date and hour in that sequence are written in the same corner on the line next below the place of issue. The date is written in the sequence; day, month, and year. The hour given in the heading is the time at which the order is signed and ready for distribution.

(d) *Serial number.* The serial number of the order appears in the upper left hand corner of the first page. Field orders of a command are numbered consecutively for the period of the war. If two or more are issued on the same day they are given separate numbers.

(e) *Map reference.* The map reference appears next below the number of the order and designates the map (s) required, giving the scale, the names of sheets, and the year of edition (when necessary), in sufficient detail to identify the exact map (s) used in the preparation of the order. When an order is accompanied by an operation map which is complete within itself, the reference may be simply: Map: Operation Map (Annex1).

EXAMPLE

1st Medical Regiment
TANEYTOWN, MD
19 Jan 40, 4:30 PM

FIELD ORDERS

No. 6

Maps: General Map, Gettysburg (1925), 1 inch equals 5 miles. Topographical Map, Gettysburg-Antietam (1925), 1: 21,120, Bonneauville and Gettysburg sheets.

(2) *Distribution of troops.* The distribution of troops shows the tactical components into which the command is divided (advance guard, main body, and other subdivisions) and the troops assigned to each. Its use is usually limited to march and outpost orders and to the first field order issued by a newly created command. When used it is headed TROOPS and follows paragraph 2 of the order, without number, or is placed on the left of the body occupying about one-third of the page. The tactical components are marked with the latter subheads a, b, c, and so forth, the troops listed under each performing the task prescribed in the correspondingly marked subparagraphs of paragraph 3 of the order.

(3) *Body.* The body of the field order contains the information and instructions for the command in the following order:

Paragraph 1. Information.

Paragraph 2. The decision and scheme of maneuver.

Paragraph 3. Tactical instructions to subordinate units.

Paragraph 4. Administrative provisions.

Paragraph 5. Location of command posts and instructions reference communication.

(a) *Paragraph 1.* This paragraph should contain only such information of the enemy and of friendly troops as subordinates should know in order that they may cooperate effectively in the performance of their prescribed tasks. This paragraph is usually divided into two subparagraphs, a and b.

(i) *Subparagraph 1a.* This subparagraph contains information of the enemy. Where enemy information is unconfirmed, estimated, or deduced, that fact should be stated.

EXAMPLE

1. a. Enemy force estimated to be a brigade reinforced by light artillery. Cavalry is protecting the right (south) flank. It is believed the hostile brigade will take up a defensive position on the high ground southeast of GETTYSBURG, pending the arrival of the remainder of the hostile division known to be at YORK.

(ii) *Subparagraph 1b.* Contains information of friendly troops. In the proper case, information of advance guard, cavalry, or other covering forces should be stated when necessary for a correct understanding of the situation. In orders of a division medical regiment this subparagraph contains the mission, scheme of maneuver, time of attack (or time of arrival or going into position in defense) boundaries between major elements,

formation, line of departure, and artillery positions of the division. Supporting medical units such as surgical hospitals, are also mentioned. A statement is also included in reference to evacuation of divisional installations by supporting troops (corps or army) with any pertinent coordinating information.

EXAMPLE

1. b. The 1st Division will attack with brigades abreast, 2d Brigade on the right, at 5:40 AM 20 January, enveloping the enemy right (south) flank. Boundary between brigades: SEVEN STARS—GETTYSBURG—BENNER HILL (all to the 1st Brigade). Line of departure: SEMINARY RIDGE—OAK RIDGE.

701st Surgical Hospital will be established adjacent to the division clearing station at daylight 20 November.

Evacuation (men and animals) by army commences 9:00 AM, 20 January.

(b) *Paragraph 2.* This paragraph contains the statement of the general plan of the commander or so much thereof as embodies his decision and scheme of maneuver. The primary mission of medical units is unchanged by any tactical situation. The normal scheme of evacuation provided for by the echelonment of specialized units in a chain of evacuation is adaptable to all common tactical situations. Only when the normal scheme of evacuation is to be materially and basically changed should mention of it be made in this paragraph. Hence this paragraph finds little use in the ordinary case in the field order of a medical unit. It is required, however, and therefore is limited in content to the general statement that the unit will furnish medical service to the command for the particular type of action contemplated and possibly the time of movement of the unit if it is to move as a whole. An operation map, if used, can replace or will tend to shorten the length of this paragraph.

EXAMPLE

2. This regiment moving into assigned position at 8:00 PM tonight will provide medical service for the division during the attack.

or

2. See operation map, Annex 1, accompanying this order.

(c) *Paragraph 3.* This paragraph assigns a definite task to each of the next subordinate units. In the orders of a medical regiment a definite task is assigned to each of the three numbered battalions. Instructions to the Headquarters and Service Company are given in paragraph 4. In other medical units a separate subparagraph for each of its subordinate elements is called for. Each subparagraph is lettered with the leading unit or the one having the most important task usually considered first. In the medical regiment the sequence is usually: 1st Battalion, 2nd Battalion, 3d Battalion. The use of an operation map may replace completely instructions in this paragraph to the extent that a reference "see operation map" in the subparagraph pertaining to any element will be sufficient. A final subparagraph, always lettered *x*, contains any general instructions pertaining to paragraph 3, applicable to two or more elements of the command. The items in subparagraph *x* are numbered serially.

EXAMPLE

3. a. The 1st Battalion, foot elements transported in ambulances, will proceed at 8:00 PM, 19 Jan via the BALTIMORE TURNPIKE to LITTLESTOWN. It will establish stations as follows:

For the 1st Brigade: * * * * *

For the 2d Brigade: * * * *

One company will be placed in regimental reserve at LITTLESTOWN.

b. The 2d Battalion, less detachments, will proceed at 8:00 PM, 19 Jan via the BALTIMORE TURNPIKE to LITTLESTOWN. It will provide ambulance service for the division and attached troops. Ambulances will be used to transport all foot troops of the 1st Battalion into their positions. Company D will proceed at 11:00 PM via the GETTYSBURG—BARLOW—HARNEY road to HARNEY and there await orders in regimental reserve.

c. The 3d Battalion will remain in its present location. The present clearing station will be expanded by making two companies active. One company will be held in regimental reserve.

x. (1) All movements will be made without lights and be completed prior to daylight.

(2) Secrecy will be maintained.

or

3. a. See operation map, Annex 1.

or

3. a. The 1st Battalion will proceed via the routes shown to positions shown on operation map.

(d) *Paragraph 4.* When data contained in the administrative order of interest to

the command as a whole are not too voluminous, they are placed in paragraph 4 of the field order. This will usually be the case in brigades and smaller units. When such data are too voluminous, or for any reason are not available at the time of issue of the field order, they are published to the command as an administrative order and reference there-to made in paragraph 4 of the field order. The paragraph includes specific instructions regarding supplies, traffic, and kindred matters. In the medical regiment order, instructions are usually limited to those given the Headquarters and Service Company for the establishment of the service station, the medical refilling point, the designation of ambulance routes, and road restrictions, if any.

EXAMPLE

4. a. The Headquarters and Service Company will follow the 3d Battalion without distance to LITTLESTOWN and establish station in the vicinity of the clearing station.

b. Medical Refilling Point: GETTYSBURG.

c. Ambulance routes: • • • •

(e) *Paragraph 5.* This paragraph in general contains communications data. In the medical regiment order the locations of the command posts for the regiment and the three battalions, the locations of the division surgeon's office and the rear echelon of the regimental headquarters, if any is established, are given. The time of opening and closing, when applicable, is noted in each case.

EXAMPLE

5. a. Command Posts:

1st Med. Regt.—J. SCHWARTZ (352-743), opens 1:00 AM.

1st Battalion—

2nd Battalion—

3rd Battalion—

or

See operation map.

b. Division surgeon's office: GETTYSBURG.

or

b. Division surgeon's office: See operation map.

c. Rear echelon, regimental headquarters: ROUND TOP (village).

(4) *Ending.* The ending contains the signature, authentication (except on the original), a list of annexes, if any, and a statement of the distribution.

(a) *Signature.* The field order is signed by the commander or his principal staff officer—customs differ in this respect. When signed by other than the commander the expression "By Command of" or "By order of" (when other than a general officer commands unit) should be placed directly above the signature. The signature is placed toward the right hand side of the page, immediately following the body of the order, and consists of the signer's name, rank, corps or arm (except for general officers) and office (Commanding, Chief of Staff, or Executive Officer).

(b) *Authentication.* The authentication of copies of the order is made by the staff officer responsible for the preparation of the order. In the medical regiment, this is usually the Plans and Training Officer (S-3). It is placed on the left hand side of the page immediately following the body of the order and consists of the word "Official" followed by the signature, rank, corps, or arm and office of the authenticating officer.

(c) *Annexes.* Whenever the detailed instructions for the operation of any service or other component of the division or higher unit are too long to be included in the field order, an annex containing these instructions is prepared by the staff officer concerned and submitted for approval to the commander. These, when approved, become annexes to the field order. They are signed by the chief of staff or executive in the manner prescribed in (a) above, and the original and all copies are authenticated by the appropriate staff officer as indicated in (b) above. Annexes to the same field order are numbered serially in the sequence in which reference is made to them in the order. In the medical regiment it is usual to have but one annex, that being an operation map. The list of annexes appears just below the authentication. It consists of the title and serial number of each.

(d) *Distribution.* A statement showing the distribution of the order is essential as a check to insure that each officer and unit directly concerned with the execution of the order receives a copy. This statement may be in detail or reference made to a standard distribution list (e.g., "Distribution A") already adopted, which shows in detail the

distribution used. Each copy of a combat order is usually numbered and a record kept showing the specific copy numbers distributed to each officer or unit. The distribution is shown immediately following the list of annexes.

EXAMPLE

By order of Colonel A

X
Lieutenant Colonel, Medical Corps
Executive Officer

OFFICIAL:

Y

Major, Medical Corps,
Plans and Training Officer (S-3)

Annex 1—Operation Map.

Distribution:

C of S

G-1

G-3

G-4

1st Brig

2d Brig

1st FA Prig

1st Bn

2d Bn

3d Bn

or

Hq & Serv Co

701st Surg Hosp

Army Surg

Corps Surg

Surg 1st QM Regt

Surg Sp Trs

Surg 1st Engrs

File

Diary

Distribution: A.

Operation Map. An operation map is a graphic presentation of a commander's decision and tactical plan placed upon a map through the use of authorized abbreviations and conventional signs. It consists of that part of a field order which can be shown graphically on a map in such detail as will not be confusing. It shows the important details of known enemy dispositions at the time the map is prepared and the contemplated dispositions and plans of action of our own troops, in so far as this information can be graphically shown without destroying its legibility.

With the modern means available for the transport of troops in the combat zone there is a direct necessity for increased speed and accuracy in the issuing of field orders. The commander must quickly estimate the situation, formulate his plan, have it coordinated with other plans, and issue the necessary orders all in a very short time. The tendency toward error is greater as the time available for issuing orders is reduced, hence the need for development of simple methods and means in the process of issuing orders. The graphic method of presenting the ideas and intentions of a commander on a map is considered the greatest aid as yet developed in the simplification process. A few lines on the map, carefully set down, will depict a situation much better in every way than a long paragraph in a written order that must be read and then staked out on a map before the reader can gain an insight into the situation. When the supply of maps is insufficient to allow the making of operation maps for distribution to each officer or unit concerned in the field order, the desired information may be shown graphically on overlays and these overlays issued in lieu of operation maps. Operation maps or overlays should be issued prior to or concomitantly with the issuance of the field order. They are usually prepared by the operations and training section of the staff.

In the preparation of operation maps, the following points should be observed:

- (1) The meaning of all data shown must be unmistakable.
- (2) Special military symbols and authorized abbreviations should be used. If other symbols are used a legend explaining them must be included.
- (3) Legibility is paramount. The amount of detail possible of depiction is controlled by this factor.
- (4) When colors are used data relating to enemy troops or operations are shown in red, and similar data for friendly troops in blue.
- (5) The operation map must have a title showing that it is an annex to the field order that it accompanies, the office of issue, place of issue, date and hour of issue. It is signed by the principal staff officer (Executive Officer in the medical regiment) and au-

thenticated by the G-3 or S-3 as the size of the unit dictates. In the use of overlays a map reference in addition to the above is essential for orientation.

(6) Before issue, it should be carefully checked, in conjunction with any written part of the field order, for completeness and accuracy.

Standing Operating Procedures. The use of standing operating procedures will have an important effect upon the extent of the detail included in orders. See Chapter V, Part I.

Administrative Orders. Administrative orders are issued by armies, corps, divisions, and smaller independent commands when the administrative details of interest to the command as a whole are too voluminous to be contained in paragraph 4 of the field order. They are formal orders and follow a prescribed form. The administrative order is based on the administrative plan of the commander which is controlled by the tactical plan for the operation and the administrative plans and orders of higher authority. Their object is to outline the operations of the several technical, supply, and administrative services; to coordinate their activities; and to transmit to the command the commander's plan of administration. Administrative orders may be complete in themselves or accompanied by annexes, one of which, termed the "Medical Plan," is of interest to medical officers.

For further details relative to administrative orders the student is referred to *Staff Officers' Field Manual*, Part One, Staff Data.

MEDICAL REFERENCE DATA

The forms, outlines, and other data supplied below have been selected from publications of the Medical Field Service School where they are used as the basis for the solution of school problems. They are especially useful as guides and check lists; they are intended for these purposes only.

OUTLINE FOR THE RECOMMENDATIONS OF THE DIVISION (CORPS) SURGEON TO G-4

Title
Place
Date, hour

SUBJECT: Recommendations for division (corps) medical service.

TO: Assistant Chief of Staff, G-4 _____ Division (Corps).

1. EVACUATION.

a. Casualties.

(1) Personnel.

(a) Collecting stations.

_____ for _____ Brigade (regiment)
_____ for _____ Brigade (regiment)

(b) Clearing station (s).

2. MOVEMENTS INTO POSITION.

a. Request release of the _____ Medical Regiment by _____ (hour and date).

b. Medical Regiment by routes as follows: (If all units are to use the same route one heading is sufficient, otherwise specify routes for the movement of separate units.)

3. AMBULANCE ROUTES.

_____ (Routes to be used between collecting and clearing station.)

4. MEDICAL SUPPLY.

Distributing point: _____

5. ARRANGEMENTS WITH ARMY.

Recommend the following arrangements be made with _____ Army (Corps):

a. A surgical hospital be made available at _____
(Place) (Date) (Hour)

b. Evacuation of clearing station to begin _____
(Date) (Hour)

or (On call).

X
Colonel, Medical Corps,
Surgeon.

OUTLINE FOR THE RECOMMENDATIONS OF THE SURGEON OF AN INDEPENDENT CORPS OR ARMY TO G-4

(Medical Plan—Annex to Administrative Order)

Title
Place
Date and hour

SUBJECT: Recommendations for medical service _____ (Army) (Corps).
TO: Assistant Chief of Staff, G-4, _____ Army (Corps).

1. DATA FOR ADMINISTRATIVE ORDERS:

a. Medical Supply.

Medical Depot _____ (place and time of opening).

b. Evacuation.

(1) Personnel.

Evac Hosps: Location, time of opening or closing.

Surg Hosps: Disposition.

Med Regt (s): Location and movement.

_____ Army (Corps) Clearing Station (s): Location and time of opening.

Emergency Evacuation Point (s): Location, time of opening.

(2) Animals.

Vet Evac Hosp (s): Location, date and hour of opening or closing.

Vet Co: Assignment and so forth.

2. MISCELLANEOUS MATTERS FOR APPROVAL.

a. Movements.

(1) Request that arrangements be made for movements of units as shown below:

UNIT - FROM—TO—ROUTE—TO BE COMPLETED BY _____
(hour and date)

Med Regt.

Evac Hosp (s).

Med Sup Dep.

Surg Hosp (s).

Vet Evac Hosp (s).

Vet Co.

(2) Use of certain roads for ambulance evacuation.

(3) Supplementary evacuation agencies (Trucks, RR cars, airplane).

b. Evacuation to communication zone.—Request regulating officer evacuate hospitals as shown below:

UNIT

LOCATION PATIENTS TIME DESIRED

Evac Hosp.

Vet Evac Hosp.

X
Surgeon.

OUTLINE FOR FIELD ORDER—MEDICAL REGIMENT WITH INFANTRY DIVISION ON THE MARCH

Title
Place
Date and hour

FIELD ORDERS

NO.

Maps:

1. Information.

a. Enemy—location, strength, composition, disposition, and such other enemy information as applies.

b. Friendly troops—location and mission of combat units; general plan of the division for the march; time movement commences; number of columns; major units in each column and their order of march; security detachments; supporting medical units.

2. Decision of regimental commander—general mission, decision as to collection and disposition of march casualties, and the time of moving to assigned positions if unit as a whole is to move at same time (otherwise hour of movement of each unit is given in paragraph 3).

3. a. Instructions for 1st Battalion—position in column, detachments to accompany security detachments, operation of march collecting posts and so forth.

b. Instruction for 2d Battalion—position of elements in march column, detachments to accompany security detachments and foot troops in columns, and march casualty collection routes.

c. Instructions for 3d Battalion—disposition in column and provisions for continuous service throughout march.

d. Disposition of the band—(usually marches with the 1st Battalion.)

x. Instructions applicable to two or more units—assembly point of elements of regiment, time of clearance, route of march, control of march, disposition of march casualties and so forth.

4. Instructions to Headquarters and Service Company—usually marches with 3d Battalion. Provisions for continuous medical supply during march and location of medical supply point, if known. Statement in reference to issue of general supplies.

5. Command posts for the regiment, each battalion, the division surgeon's office, rear echelon of regimental headquarters, if established, with times of opening and closing, or information as to where commanders can be reached during the march.

Signature

(Authentication)

Annexes:

Distribution:

A FORM FOR AN ORDER FOR A MEDICAL REGIMENT DURING COMBAT

Title

Place

Date and hour

FIELD ORDERS

NO.

Maps:

1. Information.

a. Enemy—location, strength, composition, and other pertinent facts sufficient for a clear comprehension of the enemy picture by subordinates. Refer to operation map if one is used.

b. Friendly troops—position and mission of combat units; general plan of the division for the action, including: mission; formation; zone of action (when given); time of attack; scheme of maneuver; line of departure; boundary between brigades; artillery positions and such other information as is pertinent. Supporting medical units (army evacuation, surgical hospitals, medical refilling points). Make proper reference to operation map if used.

2. Decision of regimental commander—usually to furnish medical service to the division for the particular action. If all organizations are to begin movement into position at the same hour it should be stated here; otherwise, the hour of movement of each subordinate unit should be stated in paragraph 3.

3. a. Instructions for the 1st Battalion:—to include movement, route (s), mission, location of collecting station (s).

b. Instruction for 2d Battalion:—to include movement, route (s), mission, direct service to artillery, cavalry, or other unit, movement of foot troops of 1st Battalion.

c. Instructions for 3d Battalion:—to include movement, route (s), establishment of clearing station (s), number of companies to be active.

d. Instructions regarding regimental reserves:—usually one company of each battalion, with location and any movement of units necessary.

x. Instructions applicable to two or more units or to entire regiment which are necessary for coordination but do not properly belong in another subparagraph; such as: secrecy measures, hour of completion of movements into position, priority or restrictions on roads, time of opening of installations, time of closing of stations or time of relief of units.

4. a. Instructions for the Headquarters and Service Company:—to include movement, route, location of distributing point, with pertinent instructions of supply status, either general or medical, is other than normal.

b. Location of rear echelon, regimental headquarters, when established.

c. Ambulance routes.

5. a. Location of the division surgeon's office.

b. Location of rear echelon, regimental headquarters, when established.

(Signature)

(Authentication)

Annex: (If operation map is used mention here.)

Distribution:

FORM FOR ORDERS FOR UNITS OF A MEDICAL REGIMENT

Formal written field orders will rarely be issued during operations by the units of the medical regiment. Their orders will usually be issued orally and will be fragmentary in most cases. In the case of a provisional medical battalion the complete written field order may occasionally be used. In any case where the complete written type is desired, the form suggested for the medical regiment in combat should be followed, giving instructions to the separate companies in lieu of battalions.

FORMS FOR MEDICAL PLANS

The plan of any commander for the use of his force is initially a mental one. Certain parts of medical plans require approval by the commander before they become definite and final. When those parts of the plan are approved the whole plan may be reduced to writing and would then constitute the written plan for the unit. As the plan is the logical precursor to the combat order, a written plan should be arranged in the sequence prescribed for field orders. Complete plans consist in general of the matter normally placed in paragraphs 2, 3, 4, and 5 of the field order. In order to place the material in its proper tense each paragraph should commence with the phrase "To have." While there is no prescribed outline for the complete written medical plan, the following example is furnished as a guide which can be followed for problem requirements:

PLAN FOR MEDICAL SERVICE—INFANTRY REGIMENT

(Statement of the mission—paragraph 2 of the field order).

“To have the regimental medical detachment, moving into positions at once, furnish medical service for the regiment during the attack.”

(Plans for the use of each component of the detachment—paragraph 3 of the field order).

“To have headquarters regimental medical detachment, moving at once to position at _____, remain in readiness there.”

“To have the battalion sections join their respective battalions in their assembly areas at once for attachment during the attack.” *Caution.* Do not give plans for use of these sections after attachment to battalions.

“To have all sections report hourly on the number of casualties received, treated, evacuated, or died at station.”

(Plans relative to supplies—paragraph 4 of the field order).

“To arrange for the direct replenishment of medical supplies from collecting stations during the attack.”

(Plan relative to location of commander—paragraph 5 of the field order).

“To remain in the vicinity of the regimental command post during the initial stages of the attack.”

TIME AND/OR VEHICLE REQUIREMENTS FOR EVACUATION PURPOSES

For Men:

For round trip evacuation (includes loading and unloading)—

Litter squads: 100 yards in 3 minutes.

Wheeled litters or animal-drawn ambulances: 100 yards in 2 minutes.

Motor ambulances during combat in division area: 8 miles per hour.

CAPACITIES FOR TRANSPORTATION OF SICK AND WOUNDED

VEHICLE	MEN			ANIMALS
	Sitting	Recumbent	Average	
Ambulance, animal-drawn	8	4	6	
Ambulance, motor	10	4	6	
Escort wagon	9	4	5	
Truck, 1½ ton	10	4	5	
Truck, 2½ ton	16	6	7	
RR car, coach	88			
Pullman car—12 section	48	24	36	
16 section	64	32	48	
Hospital Train	700	300	450	
Ambulance, veterinary				
Animal-drawn				1
Motor				2
Trailer, 2 horse van				6
Semi-trailer, 4½ ton				
Stock car				18
Box Car				18
Veterinary lead line				20
Medical Regiment*			100	

* While on the march the medical regiment (war strength) can carry 100 patients in its ambulances in addition to carrying all its own personnel.

For Animals:

For round trip evacuation (includes tying and untying)—

Lead line: 100 yards in 2 minutes.

To calculate the time required for evacuation of wounded men from the field, or the number of ambulances required to evacuate casualties in a given time, use the following formulae:

W—number of sick or wounded.

t—time required for round trip.

M—number of vehicles, ambulances or litters.

N—number of patients per load.

T—time required or allowed.

$$T = \frac{W \times t}{M \times N}$$

$$M = \frac{W \times t}{T \times N}$$

CLASSIFICATION OF SICK AND WOUNDED IN THE DIVISION FOR EVACUATION PURPOSES

Sixteen to 20 per cent of all casualties are killed outright or die before reaching the division clearing station.

Excluding the killed, 50 per cent of all casualties are litter patients.

Two per cent of all casualties arriving at the clearing station either are returned to duty, die, or are non-transportable beyond that station or the surgical hospital, if one is available.

One-third the sitting cases can walk for short distances beyond the division rear boundary.

Example: An infantry division of 22,000 men in an attack (1st day) of a position will incur 1342 casualties.

By consulting casualty tables:

Dead—10.0 per 1000.

To hospital station—51.0 per 1000.

Total—10 + 51 = 61 per 1000.

$22 \times 61.0 = 1342$

Of these—20 per cent will be dead or will die prior to arrival at hospital station

station	268
40 per cent will be able to walk to collecting stations	537
40 per cent will be litter cases	537

Total 100 per cent	1342
--------------------	------

Two per cent of those arriving at the hospital station will be returned to duty, die, or become non-transportable beyond the division area.

$537 + 537 = 1074$ arriving at clearing station.

Two per cent of 1074 = 21 to duty, die or non-transportable.

$1074 - 21 = 1053$ to be evacuated from clearing station.

Of those to be evacuated from the clearing station, approximately 50 per cent are sitting and 50 per cent are recumbent or 527 and 526, respectively.

DAILY LOSSES OF PERSONNEL FROM ALL CAUSES IN CAMPAIGN PER 1000 OF ACTUAL STRENGTH
(Medical Field Service School Form)

General Types of Operation	1			2			3			4			5				6				7			
	Infantry Units Below Division			Artillery			Cavalry			All Other Arms and Services			Front Line Division Reinforced Division				Corps and Army Troops (except Cavalry)				Combat Troops in Corps and Army Reserves			
	To Dead	Clr Sta		To Dead	Clr Sta		To Dead	Clr Sta		To Dead	Clr Sta		To Dead	Clr Sta	To Evac Hosp	To Gen Hosp	To Dead	Clr Sta	To Evac Hosp	To Gen Hosp	To Dead	Clr Sta	To Evac Hosp	To Gen Hosp
Attack in a Meet- ing Engagement --	16.0	80.0	1.9	9.3	1.2	16.3	16.0	11.0	1.3	6.5			6.0	32.4	32.0	27.0	0.6	6.6	6.5	4.5	0.3	6.6	6.5	4.5
Attack of a Position: First Day of Attack	25.0	125.0	2.9	14.5	2.0	20.4	20.0	14.0	2.0	10.1			10.0	51.0	50.0	42.0	1.0	10.2	10.0	77.0	0.5	7.5	7.5	5.3
Succeeding Days --	12.0	62.0	1.4	7.3	1.0	15.3	15.0	10.4	1.0	5.1			5.0	25.5	25.0	21.0	0.5	7.7	7.5	5.2	0.3	6.4	6.3	4.4
Attack of a Zone First Day of Attack	42.0	210.0	4.9	24.3	3.2	27.5	27.0	19.0	3.4	17.0			17.0	85.7	84.0	70.0	1.6	13.7	13.4	9.4	0.8	9.4	9.2	6.4
Succeeding Days --	21.0	105.0	2.4	12.2	1.6	18.4	18.0	12.5	1.7	8.5			8.0	42.8	42.0	35.0	0.8	9.2	9.0	6.3	0.4	7.1	7.0	4.9
Pursuit -----	8.0	42.0	0.9	4.9	0.6	13.3	13.0	9.0	0.6	3.4			3.0	17.4	17.0	14.0	0.3	6.6	6.5	4.5	0.2	5.9	5.8	4.1
Combat and Cover- ing and Security Forces -----	6.0	30.0	0.7	3.5	0.4	12.8	12.5	8.5	0.5	2.4			2.0	12.3	12.0	10.0	0.2	6.3	6.2	4.3	0.1	5.7	5.6	3.9
Defense in a Meet- ing Engagement --	10.0	50.0	1.2	5.8	0.8	12.8	12.5	8.5	0.8	4.1			4.0	20.4	20.0	17.0	0.4	6.3	6.2	4.3	0.2	5.7	5.6	3.9
Defense of a Position Against Attack: First Day of De- fense -----	15.0	60.0	1.1	7.0	1.0	15.3	15.0	10.0	1.2	4.8			6.0	24.5	24.0	23.0	0.5	7.7	7.5	5.2	0.3	6.4	6.3	4.4
Succeeding Days --	7.5	30.0	0.9	3.5	0.6	11.2	11.0	8.0	0.6	2.4			3.0	12.3	12.0	11.5	0.3	5.8	5.7	3.9	0.15	4.9	4.8	3.3
Defense of a Zone First Day of De- fense -----	25.0	100.0	2.9	11.6	2.0	18.4	18.0	12.5	2.0	8.1			10.0	40.8	40.0	36.0	1.0	9.2	9.0	6.3	0.5	7.1	7.0	4.9
Succeeding Days --	12.5	50.0	1.5	5.3	1.0	13.3	13.0	9.5	1.0	4.0			5.0	20.4	20.0	18.0	0.5	6.7	6.6	4.8	0.25	5.4	5.3	3.6
Periods of Stabilized Defense -----	5.0	20.0	0.6	2.3	0.4	12.2	12.0	8.5	0.4	1.6			2.0	8.2	8.0	7.0	0.2	6.1	6.0	4.2	0.1	5.6	5.5	3.9
Retirement and De- laying Action ---	4.0	20.0	0.5	2.3	0.4	12.2	12.0	8.5	0.3	1.6			2.0	8.2	8.0	7.0	0.2	6.1	6.0	4.2	0.1	5.6	5.5	3.9
Under All Other Conditions of Campaign -----																								

Under conditions of campaign not enumerated above casualty rates for men will be approximately the same for all troops.
The following rates will be assumed: Dead, negligible; To clearing station, 4.5 per 1000; evacuation from clearing station to evacuation hos-
pital, 2.5 per 1000; from evacuation hospital to general hospital, 1.5 per 1000.

NOTES:

1. Disregard enemy casualties abandoned on the battlefield unless specifically called for in the statement of the requirement.
2. The factors given in the above table are intended for school purposes only.

DAILY LOSSES OF ANIMALS FROM ALL CAUSES IN CAMPAIGN PER 1000 OF ACTUAL STRENGTH
(Medical Field Service School Form)

General Types of Operation	1				2				3				4				5				
	Infantry, Artillery and Other Units				Cavalry				Front Line; Division in Corps or Reinforced Division				Corps and Army Troops (except Cavalry)				Combat Troops in Army Reserve				
	To Dead	Vet Clr Sta	To Evac Clr Sta	To Gen Hosp	To Dead	Vet Clr Sta	To Evac Clr Sta	To Gen Hosp	To Dead	Vet Clr Sta	To Evac Clr Sta	To Gen Hosp	To Dead	Vet Clr Sta	To Evac Clr Sta	To Gen Hosp	To Dead	Vet Clr Sta	To Evac Clr Sta	To Gen Hosp	
Attack in a Meeting Engagement	32.0	40.0	5.0	17.6	16.0	2.0			12.0	17.6	16.0	3.0		1.2	4.4	4.0	0.6	0.6	3.6	3.3	0.5
Attack of a Position: First Day of Attack	50.0	62.5	8.0	22.0	20.0	3.0			20.0	27.5	25.0	5.0		2.0	5.5	5.0	0.7	1.0	4.1	3.7	0.5
Succeeding Days	24.0	31.0	4.0	16.5	15.0	2.0			10.0	13.7	12.5	2.0		1.0	4.1	3.7	0.5	0.6	3.3	3.2	0.4
Attack of a Zone: First Day of Attack	84.0	105.0	13.0	23.7	27.0	4.0			34.0	46.2	42.0	7.0		3.2	7.4	6.7	0.9	1.6	5.1	4.6	0.6
Succeeding Days	42.0	62.5	7.0	19.8	18.0	3.0			16.0	23.1	21.0	4.0		1.6	5.0	4.5	0.6	0.8	3.9	3.5	0.5
Pursuit	16.0	21.0	2.5	14.3	13.0	2.0			6.0	9.4	8.5	2.0		0.6	3.5	3.2	0.5	0.4	3.2	2.9	0.4
Combat of Covering and Security Forces	12.0	15.0	1.5	13.2	12.0	2.0			4.0	6.6	6.0	1.0		0.4	3.4	3.1	0.4	0.2	3.2	2.8	0.4
Defense in a Meeting Engagement	20.0	25.0	3.0	13.2	12.0	2.0			8.0	11.0	10.0	2.0		0.8	3.4	3.1	0.4	0.4	3.2	2.8	0.4
Defense of a Position Against Attack:																					
First Day of Defense	30.0	30.0	4.0	16.5	15.0	2.0			12.0	13.2	12.0	3.0		1.0	4.1	3.7	0.5	0.6	3.5	3.2	0.4
Succeeding Days	15.0	15.0	2.0	12.1	11.0	2.0			6.0	6.6	6.0	2.0		0.6	3.1	2.8	0.4	0.3	2.6	2.4	0.3
Defense of a Zone: First Day of Defense	50.0	50.0	8.0	19.8	18.0	3.0			20.0	22.0	20.0	4.0		2.0	5.0	4.5	0.6	1.0	3.9	3.5	0.5
Succeeding Days	25.0	25.0	4.0	14.3	13.0	2.0			10.0	11.0	10.0	2.0		1.0	3.6	3.3	0.5	0.5	2.9	2.6	0.4
Periods of Stabilized Defense	10.0	10.0	1.5	13.2	12.0	2.0			4.0	4.4	4.0	1.0		0.4	3.3	3.0	0.4	0.2	3.0	2.7	0.4
Retirement and Delaying Action	8.0	10.0	1.5	13.2	12.0	2.0			4.0	4.4	4.0	1.0		0.4	3.3	3.0	0.4	0.2	3.0	2.7	0.4
Under All Other Conditions of Campaign																					
The following ratios will be assumed: Dead, negligible; evacuation from veterinary aid stations and veterinary clearing stations to evacuation hospitals, 1.25 per 100; from evacuation hospitals to general hospitals, 0.1 per 100.																					

The following rates will be assumed: Dead, negligible; evacuation from veterinary aid stations and veterinary clearing stations to evacuation hospitals, 1.25 per 1000; from evacuation hospitals to general hospitals, 0.1 per 1000.

NOTES:

1. Disregard enemy casualties abandoned on the battlefield unless specifically called for in the statement of the requirement.
2. The factors given in the above table are intended for school purposes only.

CHAPTER VIII

ADMINISTRATION

Purpose of Chapter. This chapter includes useful information about the subject of Administration. Units of the Medical Department maintain the same records for their personnel, supply, mess, correspondence, and other administrative requirements as all branches of the Army. In addition, the department maintains records of the utmost importance which pertain to the execution of its own professional functions.

The officer of any corps of the Medical Department must prepare himself to perform efficiently many duties in addition to his purely professional functions. He may, for example, be required to exercise command of a medical detachment, a unit of a medical regiment, or a hospital; in the performance of such missions he is confronted with problems of leadership, organization, mess and supply, training, discipline and morale, as well as administration. To the same extent as all other officers he may sit as a member of a military court or of a board of officers. He may be assigned to duty as executive or adjutant of a medical command. Thus, the officer within the Medical Department must be ready for a diversification of responsibilities of which his brother in civilian practice may be entirely unaware.

The student of administrative procedures does well to become imbued at the outset with the need for absolute accuracy in the records which he will prepare. Many are records of original entry and become the basis for other compilations, analysis, and summaries. They must contain the truth. Further, similar records must be prepared alike in all organizations, for otherwise no reliable comparisons can be drawn therefrom. The language or phraseology used is important. Unless exact phrasing is prescribed (as in the case of entries in the morning report) there is no acceptable substitute for good, clearly expressed, grammatical English, legibly recorded, which will impart the same meaning to all readers. Battles are not won by records and "paper work". Still, the winning of battles may be simplified by having men, munitions, and transportation in necessary quantities at the right place at the time required. All this requires good administration and accurate records. It is an important part of good staff work which is vital to the commander for the efficient exercise of command. Skill in required administrative procedures is an important part of officer-training, and in this training accuracy, completeness, and clarity must be obtained.

The two distinct phases of administration with which the Medical Department and its component units are concerned are presented under the headings: Medical Department Administration and Administration of Medical Units.

MEDICAL DEPARTMENT ADMINISTRATION

Medical Department administration is the management of the *medical activities* of a military command, rather than the supervision of the affairs of the department itself. The fixed or nonmobile military commands, such as the camps, posts, and stations, are principally considered. While certain Army Regulations are epitomized, the text is not a complete abstract of them; neither will it completely replace Army Regulations and Manuals as a reference for the accomplishment of records, reports, and returns by medical officers. No effort has been made to reproduce more than a few of the many blank forms employed, though they are frequently referred to by name and number. The printed instructions on the blank form itself are detailed and specific and should always be consulted. An attempt has been made to explain essential duties of Medical Department officers and the means and methods of administering Medical Department activities. Some of these may be termed customs of the service inasmuch as they are not covered by Army Regulations.

The duties of medical officers as such are three-fold in character: *professional*—duties incident to the practice of medicine, including physical examinations for the preservation and promotion of health; *advisory*—duties pertaining to a medical officer as a staff officer; and *administrative*—duties pertaining to a commander of medical department personnel and establishments and the patients therein. In addition, officers of the Medical Department serve as members of courts-martial and boards of officers.

The duties of the dental officers as such are similar to the medical officers in their profession; however, their duties are included within the responsibility of the medical officer who is in command of the medical establishment or unit.

The duties of the veterinary officers as such are usually professional and advisory. These include the preservation and promotion of the health of Army animals and the inspection of food and forage as purchased for the Army by the Quartermaster. The administrative duties of the Veterinary Corps are limited to those units within the veterinary establishment or unit—the unit surgeon or commanding medical officer is responsible in his absence.

The duties of the Medical Administrative Corps officers are purely administrative. Their services are intended to assist the other Medical Department officers in the administration of Medical Department affairs. Medical Administrative Corps officers who are qualified as pharmacists may in addition serve in that capacity in hospital pharmacies.

Titles of Medical Officers. The title of the senior medical officer at general headquarters or with an expeditionary force is "chief surgeon". The senior medical officer with any non-medical command, except as prescribed above, is designated as "surgeon," thus:

Command	Staff	Official Address
Corps area	Corps Area Surgeon ..	The Surgeon, Second Corps Area
Post, camp, or station	Station Surgeon	The Surgeon, Fort
Army Transport	Transport Surgeon ..	The Surgeon, U.S.A.T.
Army	Army Surgeon	The Surgeon, First Army
Corps	Corps Surgeon	The Surgeon, II Corps
Division	Division Surgeon ..	The Surgeon, Fifth Division
Regiment (except medical regiment) ..	Regimental Surgeon ..	The Surgeon, Eighth Infantry
Battalion (except medical regiment and medical battalion)	Battalion Surgeon ..	The Surgeon, Second Engineer Battalion ..

The senior medical officer of a general hospital, dispensary, or other separate medical unit is designated as commanding officer, e.g., "The Commanding Officer, 32d Medical Battalion, Carlisle Barracks, Pennsylvania." Although the senior medical officer at a station may be the commanding officer of the hospital, he is referred to as the surgeon in order to distinguish him from the commanding officer of the garrison or component units therein.

Functions of a Staff Medical Officer. There is normally a staff medical officer for each command larger than a company. The senior medical officer present for duty with the command is, in addition to his other duties, the staff medical officer. The basic title of a staff medical officer is "surgeon" which, as commonly used in the military service, indicates his staff or advisory position rather than his professional qualifications and is analogous to such terms and positions as quartermaster, adjutant, etc. The duties of "the surgeon" are advisory and administrative; advisory in his relations as a staff officer and administrative in his conduct of the medical department as a technical and supply service under the control of his commanding officer. See Chapter III, "Duties of the Division Surgeon."

Duties in Connection with the Dental Service. The dental service is a specialized branch of the medical service. As such it is controlled by the surgeon. In the absence of a dental officer the surgeon may, under certain conditions, obtain the services of civilian dentists.

Duties in Connection with the Veterinary Service. While appropriately united in one department and administered under one head—the Surgeon General—the veterinary and medical services are in a technical sense separate except as they may occasionally meet on the common ground of an animal disease which might possibly be communicable to man. Proper coordination of its activities as a branch can be assured only when there is but one representative of the medical department on the staff of the commanding officer. Such duty logically devolves upon the senior medical officer present with the command. The veterinarian furnishes the surgeon with such technical information concerning veterinary matters as may be necessary for him to represent properly that phase of the medical departments' activities to the commanding officer. The technical and professional activities of the veterinarian are not supervised by the surgeon.

In general the duties of a staff medical officer in connection with the veterinary service are as follows:

In the absence of a veterinary officer the surgeon is directly responsible for the veterinary service, including its administration.

In the absence of all veterinary personnel (officers and enlisted men) the surgeon represents the medical department in matters pertaining to the veterinary service, utilizing such facilities as may be at his disposal. He keeps the commanding officer advised as to the veterinary needs of the station or command.

Medical Attendance

The principal agencies maintained for providing or initiating medical attendance in the Army are:

At permanent stations—hospitals and dispensaries.

In the field—aid stations, collecting stations, clearing stations, hospitals, and dispensaries.

For Whom Authorized. Medical attendance is authorized for the following personnel:

Military. Officers, warrant officers, cadets, Army nurses, enlisted men, and contract surgeons (full time) of the Army of the United States while in active federal service, except those not on a duty status while absent from their proper station or command with or without authority, general prisoners, and prisoners of war.

Persons of the classes enumerated above who are on the retired list of the Army and who report in person at any Army dispensary or hospital. Medical officers and contract surgeons are not required to leave their stations to attend those on the retired list.

Members of the National Guard not in federal service while in attendance at a federal training camp and under certain other conditions as prescribed in National Guard Regulations.

Members of the Officers' Reserve Corps and of the Enlisted Reserve Corps, when on an active duty status.

Civilian. Members of the Reserve Officers' Training Corps while attending a federal training camp.

Trainees at a Citizens' Military Training Camp. Persons in military custody or confinement and applicants for enlistment while under observation.

Whenever practicable the families (including wife, minor children, other dependents, and servants of the household) of military personnel enumerated above, when residing with and actually dependent upon such persons. Civilian employees of the Army (including civilian employees of post exchanges) at stations or in the field where other medical attendance can not be procured. Civilian employees of the United States Government who receive personal injuries in the performance of official duty who may report for treatment at an Army dispensary or hospital upon request of the officer under whom they are employed, provided other government hospitals for the treatment of such employees are not more convenient of access.

Civilian Medical Attendance. When medical attendance is required by an officer, warrant officer, Army nurse, enlisted man, or contract surgeon (full time) on duty with any command or detachment, or by a prisoner in military custody, or by an applicant for enlistment under observation, and cannot otherwise be had, the commanding officer may employ the necessary civilian service and just accounts therefor will be paid by the medical department.

Regularly licensed civilian physicians may be authorized by the commanding officer to practice medicine upon military reservations or camps under certain conditions. In general, regulations provide that civilian physicians so practicing must observe the current rules relative to the protection of the command against communicable diseases, and the established ethics of the civil medical profession, and furnish data for preparation of sick and wounded records in the case of military personnel.

Civil Medical Practice. Professional private and civil practice in civilian communities, the needs of which are being satisfactorily met by civilian practitioners, will ordinarily be restricted to consultation practice with such civilian practitioners, and to emergency measures necessary to save life or to prevent great suffering. (Par. 8, AR 40-510.)

Releasing Information Regarding Condition of Patient. Medical officers may impart such information regarding the condition of a sick or wounded patient as may be necessary

to allay the anxiety of relatives and friends. The furnishing to unauthorized persons of information which can be made the basis of a claim against the Government is prohibited.

Sick Call

The Daily Sick Report. When an officer, contract surgeon, warrant officer, cadet of the United States Military Academy, flying cadet, Army nurse or enlisted man is in need of medical attention his (or her) name and grade, with Army serial number, is placed, preliminary to his attendance at sick call, upon the daily sick report (W. D., A. G. O. Form No. 5) of the organization or detachment. The daily sick report consists of two parts:

The organization commander's report. This is prepared in the organization (company) and is signed by the commander thereof. If the organization commander can not state definitely whether the alleged sickness originated in the line of duty he places an interrogation mark (?) in the proper column pending investigation and decision. It is the duty of the organization commander to determine the line of duty status, particularly in the case of injury which is likely to result in partial or complete disability of the patient.

The medical officer's report. This is filled out and signed at the place of holding sick call. The line of duty entry is particularly important because an individual absent from duty for more than one day because of disease incurred not in line of duty and as the result of misconduct has pay deducted for the period of such absence. He may also be required to make good the time lost before his enlistment period is considered complete. The medical officer indicates in the disposition column the status of the patient as "hospital," "quarters," or "duty." There is no such status as "light duty" or "part duty." The daily sick report referred to is used by each company in rendering its morning report to headquarters. Information on the sick report should be complete in accordance with the column headings as some of the entries may affect the soldier's pay.

Information showing line of duty status or entries which might form the basis of a claim against the government will not be given to any person except officers of the War, Treasury, or Interior Departments or the Department of Justice, nor is the information shown in the reports intended for those not directly concerned. It will be kept in the organization under the supervision of the organization commander.

Conduct of Sick Call. Sick call is a military formation held daily at an hour designated by the commanding officer, except when the command is in combat. At this time all sick or injured should be conducted by a noncommissioned officer to the surgeon at the hospital, dispensary, or other place for holding sick call to determine whether they can continue their regular duties or whether they should be taken up on the surgeon's report of sick and wounded and admitted to hospital or quarters. This examination of the sick is in the nature of a "sorting" and should be conducted as expeditiously as possible and at a suitable hour so that the operations of the organization may not be delayed or interrupted. Those cases obviously needing "hospital" or "quarters" treatment are so marked on the daily sick report. Admission to hospital is accomplished after the "sick call" has been completed. Those able to do "duty" are so marked on the daily sick report and immediately sent back in charge of their noncommissioned officers to their organizations. Should any of the "quarters" or "duty" type require further examination or treatment, an appointment therefor should be arranged. In case of emergency, sick or injured may be admitted to the hospital at any hour. However, the proper notations should be made on the company sick report as soon as practicable.

Patients not admitted to hospital or quarters but who are treated are recorded on an "out-patient" index card which shows in brief the diagnosis and treatment given. This index is useful in summarizing the number of out-patients treated and treatments given each month, a record which is submitted monthly by the surgeon.

Recruiting and Physical Examinations

At each post, camp, or station a recruiting officer is designated to make enlistments. While such duties may be delegated to medical officers the latter are usually concerned only with the physical examination of the applicants. These examinations are made by medical officers or, in their absence, by civilian physicians hired for the purpose. The physical examination of candidates for commission is also a function of the Medical Department.

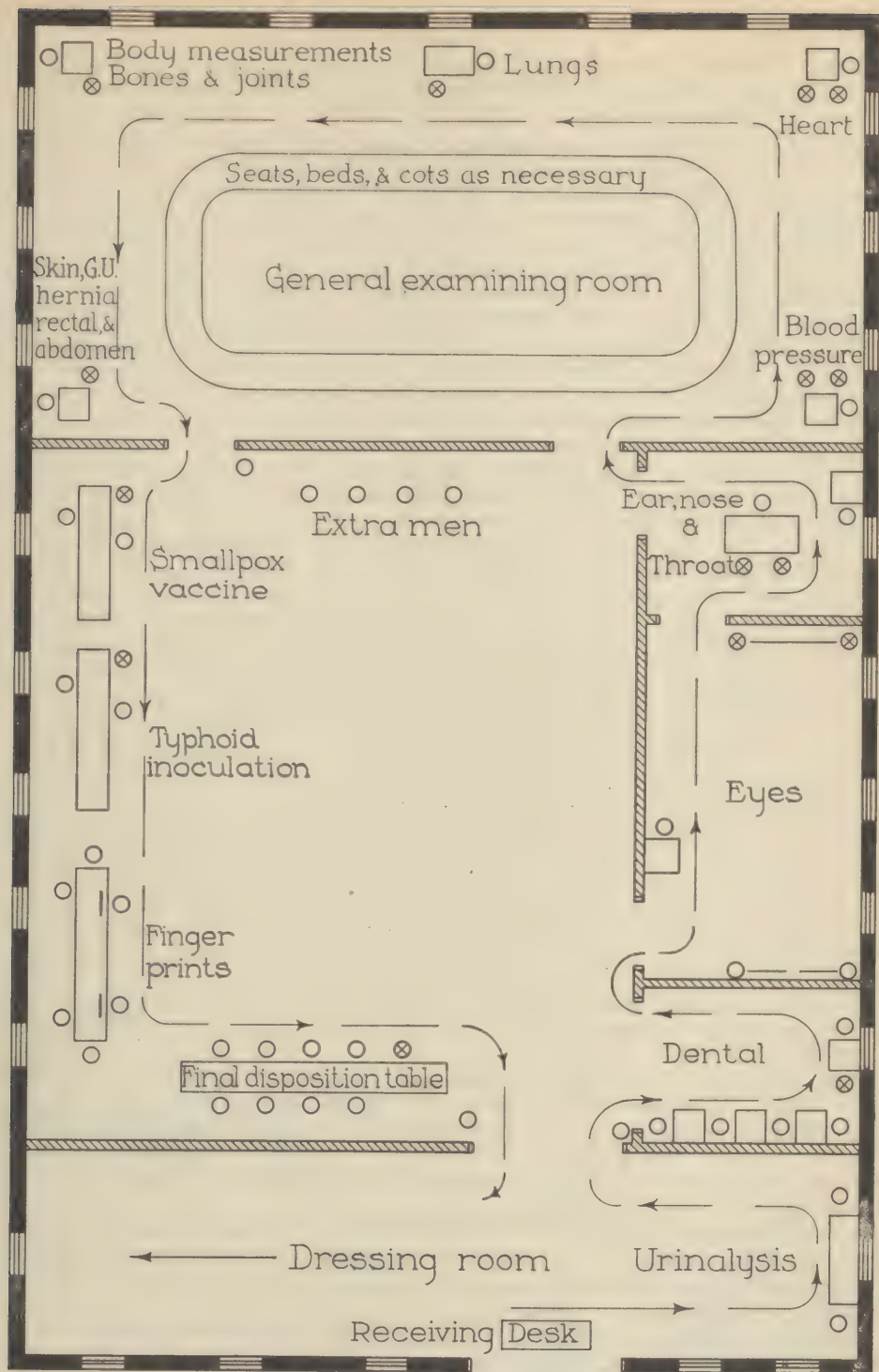


Plate 1. Diagram Showing Suitable Arrangement of a Physical Examining Room.

Physical Standards. Army Regulations prescribe standards of physical examination in order to insure efficiency and uniformity in the procurement of personnel that will be physically fit for the rigors of military service. In general the applicant must be able to see and hear well; his heart must be competent to stand the stress of physical exertion; he must have intelligence enough to understand and execute military maneuvers, obey commands, and protect himself; and he must be able to transport himself by marching. The physical standards prescribed for candidates for commission are in some respects higher than those prescribed for applicants for enlistment, but, in general, the same physical standards apply to both. The physical standards for flying differ and are more exacting; officers who conduct such examinations are specially trained and qualified for that work. In time of actual or threatened hostilities the high standards specified for peace time are expected to be modified in order to permit the enrollment of individuals suitable for special service or particular military duties. Classifications as to fitness for special types of service will depend upon the standards set at the time by the War Department.

Conduct of Physical Examinations. The physical examination of a few applicants presents no real difficulties. The examination of large numbers of men in time of mobilization, however, requires a high degree of organization. Any scheme of examination for military service involves the following steps: preparation of records; physical examination; preparation of identification records; and immunization against smallpox, typhoid, and paratyphoid. The ideal plan for the examination of large increments will include the bathing, disinfection, physical examination, and the issue of uniforms and equipment under one roof. The room or rooms for the physical examination should have ample space and should permit an arrangement of the several examining groups so that quiet may be maintained. An even temperature, so that men in the nude may be comfortable, is necessary. It is important that the clerks and examiners be so arranged in the logical sequence of the examination that there be no congestion of examinees at any one place; if not, confusion will result. Teamwork is essential; there should be a continuous flow of examinees, moving on the one-way traffic principle. Plate 1 shows a suitable arrangement of an examining room. Additional examining personnel may be added to the stations as needed.

Personnel for an Examining Team. A small examining team should have the following personnel: A general supervisor; an internist; a surgeon; an eye, ear, nose, and throat examiner; and a dentist. Each of these officers should have an intelligent enlisted assistant, capable of making entries on the physical examination form. In addition there should be a clerk to initiate the physical examination forms and another to complete them; also three noncommissioned officers or specialists to conduct the immunization and to take the fingerprint records. A noncommissioned officer and several orderlies are desirable to maintain order and to safeguard the clothing of disrobed applicants. A newly organized group outlined as above should be able to examine 12 to 15 persons per hour. By continuous functioning as a team and with proper supervision the group may examine twice that number.

Larger teams will include specialists such as psychiatrists, orthopedists, and heart and chest examiners. The rate of examination per applicant examined does not increase in direct proportion to the size of the examining group. If many examiners and suitable space are available better results will be obtained in examining continuous large increments by utilizing several examining teams. Alternating teams in 4-hour shifts is a good method when space is limited.

Physical Examination Records. The records listed below are made at the time of enlistment. Only those marked with an asterisk (*) are usually made by the medical examiner; the others pertain more particularly to the duties of the recruiting officer.

Report of enlistment.

Enlistment record. (This contains the form for * physical examination, which portion is accomplished by the medical examiner).

*Identification record card consisting of fingerprints, signature, and identification marks.

Service record (accompanies the recruit).

Individual clothing record.

Individual equipment record.

*Immunization register. (This is made out in duplicate. The original is sent to the organization commander who enters the completed record of immunization on the service record. The duplicate is filed with the vaccination records at the station where immunization is completed).

REPORT OF PHYSICAL EXAMINATION

(See AR 40-100 and 40-105)

Instructions.—Unless otherwise prescribed, this form will be used for all physical examinations of officers, nurses, or warrant officers; applicants for appointment as such in the Regular Army, National Guard, or Officers' Reserve Corps; and enrollment in the Reserve Officers' Training Corps. Use typewriter if practicable. Attach plain additional sheets if required.

1. (Last name) (First name) (Middle initial) (Serial number)

2. (Grade) (Organization and arm or service) Age (Nearest birthday) Years of service (Whole number only)

3. Nature of examination ¹ Component of Army ²

4. Typhoid vaccination. No. series completed Last series 19

5. Date of last smallpox vaccination Type of reaction

6. Other vaccination or immunity tests

7. Medical history ³

8. Eyes

Distant vision: Right 20/ correctible to 20/ by ⁴

(Snellen type) Left 20/ correctible to 20/ by ⁴

Near vision: Right J# correctible to J# by ⁴

(Jaeger type) Left J# correctible to J# by ⁴

Refraction ⁵ (under cycloplegic): Right Left

Color perception (red and green) ⁶

9. Ears

Hearing (low conversational voice): Right /20. Left /20. Audiometer (percent loss): Right Left

10. Nose and throat

11. Teeth: ⁷ Right (Examinee's) Left

8 7 6 5 4 3 2 1 1 2 3 4 5 6 7 8

16 15 14 13 12 11 10 9 9 10 11 12 13 14 15 16

Indicate: Restorable carious teeth by O; nonrestorable carious teeth by /; missing natural teeth by X.

Remarks, including other defects

Prosthetic dental appliances Classification

12. Posture Figure Frame

(Excellent, good, fair, bad) (Slender, medium, stocky, obese) (Light, medium, heavy)

13. Temperature Height inches. Weight pounds. Chest: Rest inches; inspiration inches; expiration inches. Abdomen inches.

14. Cardiovascular system: Heart

Blood pressure: S. D. Pulse: Rate—Sitting Immediately after exercise

Two minutes after exercise Character

Arteries Varicose veins

15. Respiratory system

16. X-ray of chest ⁸

17. Skin and lymphatics Endocrine system

18. Bones, joints, and muscles

Feet

19. Abdominal viscera

20. Hernia Hemorrhoids

¹ Appointment, promotion, retirement, annual, active duty, special.

² Regular Army; National Guard; Officers' Reserve Corps; Reserve Officers' Training Corps.

³ If annual physical examination, record only for past year.

⁴ If annual physical examination, record only distant and near vision, and state whether defect is properly corrected.

⁵ When indicated.

⁶ Not required for annual physical examination.

⁷ If rejected for appointment in Regular Army because of malocclusion, send plaster models to the Surgeon General.

⁸ Required for candidate for commission.

W. D., A. G. O. Form No. 63
August 1, 1939

Plate 2. Report of Physical Examination (Front).

Immunization. Inasmuch as the immunization of an individual cannot be completed at the time of enlistment, arrangements must be made to complete it. Medical personnel and a suitable place (usually the hospital) must be provided. Arrangements must also be made with organization commanders to insure that all personnel on which immunization has begun will report on the proper date at the time and place designated. Cooperation between medical officers and organization commanders is an important factor in completing immunizations expeditiously. If large groups are being immunized, one medical officer with several assistants will be needed for the administration of the second and third doses of typhoid vaccine. One medical officer and an assistant are usually sufficient to determine the result of the smallpox vaccination and to revaccinate unsuccessful cases. Each soldier appearing should have with him his immunization register on which

Phraseology used in completing these forms should indicate accurately the actual physical condition of the officer or officer-candidate.

Military Hospitals

In War. In time of war *mobile* hospitals form a constituent part of the mobile forces. These hospitals are established in the combat zone and comprise evacuation hospitals, surgical hospitals, convalescent hospitals, and the clearing stations (emergency and in camp) operated by the clearing companies of medical regiments, medical battalions, or medical squadrons. These field medical installations are discussed in Chapters II, III, and IV.

The *fixed* or nonmobile military hospitals are identical in time of war or peace and serve the same general purposes. They are established in the zone of the interior and the communications zone. Whenever practicable three or more general hospitals may be grouped at one place into an administrative and clinical organization known as a "hospital center." A convalescent camp constitutes a part of the hospital center. The administration of these fixed hospitals is similar to that of the fixed hospitals of peace time.

In Peace. Military hospitals in time of peace are of two general types: station hospitals and general hospitals.



Photo by U. S. Army Signal Corps.

Plate 4. Station Hospital, Fort Sam Houston, Texas.

Station Hospitals. (See Plate 4.) These are provided for the hospitalization of the sick and wounded of local commands. They function under local commanders, e.g., the station hospital at Fort Lincoln is conducted by the surgeon at Fort Lincoln who functions under the commanding officer, Fort Lincoln. Station hospitals ordinarily have facilities to hospitalize 5 per cent or more of the local command.

General and Department Hospitals. These are provided for the hospitalization of the sick and wounded of larger areas and for the care of special cases for which the facilities of large hospitals are more adequate. During peace time the general hospitals function under the immediate direction of the Surgeon General. The corps area commanders' authority over general hospitals, except in time of war, is limited chiefly to recruiting, general supply, and disciplinary and inspectorial control. The department hospitals in Honolulu and Manila serve the same purposes as general hospitals but are under local departmental control. The organization of a general hospital is shown in Plate 5.

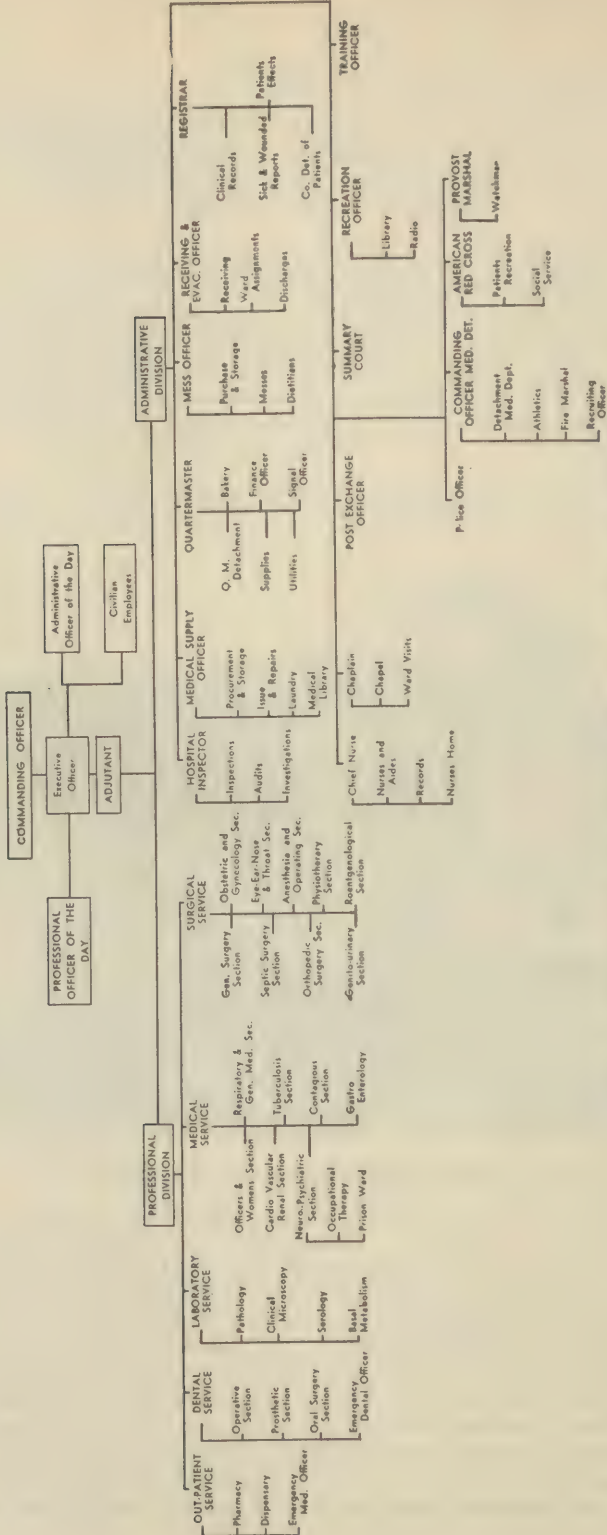


Plate 5. Organization of a General Hospital, Zone of the Interior.

The permanent general and department hospitals of the Army are:

Army and Navy General Hospital, Hot Springs, Arkansas.
 Fitzsimons General Hospital, Denver, Colorado.
 Letterman General Hospital, San Francisco, California.
 Sternberg General Hospital, Manila, Philippine Islands.
 Tripler General Hospital, Honolulu, Hawaiian Islands.
 Walter Reed General Hospital, Washington, District of Columbia.
 William Beaumont General Hospital, El Paso, Texas.

Veterinary Hospitals. Hospitals of both the fixed and mobile types are provided by the veterinary service for the care of animals and are indicated by adding to the usual basic title the word "veterinary," i. e., "veterinary general hospital" and "veterinary station hospital."

Army Dispensaries. To provide medical attention for groups of military personnel not located at army stations, or where there is an excessive amount of out-patient clinic service, general dispensaries staffed with Medical Department officers and enlisted men are established at these centers of military activity.

Administration of Fixed Hospitals

Hospital Services. For convenience of administration and in the interest of professional efficiency, the commanding officer of each Army hospital organizes the professional and other activities of his hospital into services and prescribes the number and the line of control over them and their relationship to each other. The following represent the services customarily established in large hospitals, though considerable variation therefrom is allowed to the discretion of the commanding officer of the hospital concerned: administrative; dental; eye, ear, nose, and throat; laboratory; medical; neuropsychiatric; nursing; orthopedic; physical reconstruction; roentgenological; surgical; urological.

The administrative service of a fixed hospital includes such personnel and activities as the commanding officer of the hospital may prescribe. The personnel and activities that follow properly belong in the administrative service:

Personnel. Commanding officer, executive officer, adjutant, personnel officer, detachment commander, registrar, mess officer, supply officer, chaplain, and chief nurse.

Activities. Admission and discharge of patients, hospital inspection, hospital mess, fire control, summary court, recruiting, post exchange, detachment, Medical Department, etc.

Titles of Duty Personnel. The personnel performing the more important administrative and clinical duties at a hospital are designated as follows:

Duty	Title
Commanding hospital (the surgeon,	Commanding officer.
In charge of a service	Chief of ——— service.
Commissioned assistant on a service	Assistant ——— service.
Officer in charge of records of sick and wounded	Registrar.
Officer in charge of a ward	Ward officer.
Commissioned assistant in a ward	Assistant ward officer.
Nurse in charge of a ward	Head nurse.
Principal enlisted assistant in a ward	Ward master.
Other enlisted assistant in a ward	Ward assistant.

Medical Officer of the Day. A medical officer of the day is detailed by roster daily to serve as such for 24 hours. His functions are both administrative and professional, although in large hospitals the duties may be apportioned among several individuals. During his period of duty he holds himself available for emergency professional service, particularly during hours when other medical officers are off duty. He is in charge of the hospital at night, makes inspections at stated intervals, inspects the mess at each meal, and represents the commanding officer of the hospital in the latter's absence.

Hospital Commanders

Duties of Commanding Officer of Hospital. The commanding officer of a hospital is responsible for its proper discipline and administration, including the care and prepara-

tion of reports, registers, and records as well as for the care and safeguarding of all public property which may come into his possession; for the proper expenditure of supplies and funds; and for the preparation of requisitions, returns, and pay rolls of the hospital. While the commanding officer is charged with the execution of duties properly delegated by him to an assistant, yet he is responsible for exercising such supervision over duties thus delegated as to insure their prompt and efficient performance by the designated subordinate.

Relations to Patients. The commanding officer (or one of his commissioned assistants) determines what patients are to be admitted to or discharged from the hospital. Admittance and assignment of patients to wards are usually accomplished by the medical officer of the day. The commanding officer is responsible for supervising the care and treatment of all patients. He, or a commissioned assistant designated by him, commands the detachment of patients. When the condition of a patient has reached a stage which seriously endangers life, the commanding officer communicates the fact (by telegraph or otherwise) to the person designated by the patient to be notified in case of emergency. In such cases the commanding officer also notifies the chaplain on duty at the station.

Relations to Duty Personnel. The commanding officer (or one of his commissioned assistants) commands the duty personnel as a detachment commander. He assigns the personnel to appropriate duties and prescribes and enforces regulations as to the sanitary, disciplinary, and other requirements of the hospital.

Inspections by Hospital Commander. Depending on its size, the commanding officer inspects or directs the inspection of the entire hospital daily, and on Saturdays he inspects or causes to be inspected the detachment, Medical Department.

The Registrar

Duties of Registrar. The office of registrar is peculiar to the Medical Department. The registrar has charge of all medical and surgical records and sees that careful and accurate clinical histories, statistical tables, etc., are kept. He prepares all reports and returns pertaining to the sick and wounded. If the commanding officer does not assume direct command of the detachment of patients, the registrar has that function. In this capacity he has charge of the service records, accounts, and returns of patients. He is also custodian of their money and valuables.

Sick and Wounded Reports. The name of every person admitted to hospital or marked "quarters" is entered on a sick and wounded register card and a sick and wounded report card (Form 52 M. D.) at the time of admission. These cards are duplicates of each other, the register card being the "retained" copy. Register cards are kept in two files: (1) current, arranged alphabetically according to the surname of the patient, and (2) permanent, filed by register serial number. The current file is a ready index to the patients in hospital. In time of war in the theater of operations the emergency medical tag and the field medical record are used in lieu of Form 52 M. D. (See Emergency Medical Tag, Chapter I, and Field Medical Record, Chapter III.)

Of the reports that a hospital is required to render, the report of sick and wounded is one of the most important. This report is rendered monthly. It consists of a report sheet (Form 51 M. D.) (see Plates 6 and 7), accompanied by report cards (Form 52 M. D.). A report card is rendered for each case completed (discharged, transferred, died, etc.) during the month, or for those uncompleted cases who have been under treatment more than one month. (See Plate 8.) That is, a report card is rendered at the end of the month succeeding the month the case was admitted and again on its completion. The information necessary to complete these cards (diagnosis, complications, operations, etc.) is obtained from the patient's clinical record (Form 55 M. D.) and other reports furnished by ward officers. A report card must contain all the information concerning a patient necessary to establish his identity without question. Care must be exercised in having the name and serial number correct. The diagnosis should show in detail the nomenclature prescribed in Army Regulations (international terms of diagnoses). It is important that the "line of duty" status be noted correctly inasmuch as this card may be referred to subsequently in case of a claim for pension. In the case of injury, line 16 should show the injury code number. This procedure is for the purpose of securing information which will be of assistance in the prevention of accidents and to

Form 51
MEDICAL DEPARTMENT, U. S. ARMY
(Revised April 21, 1934)

REPORT SHEET

1. REPORT OF SICK AND WOUNDED AT—

Station Hospital, Fort

(Here state the name or number of the hospital, or organization, with location on the last day covered by the report, except in the theater of operations in time of war, when the numerical designation only will be given.)

2. PERIOD

Month of October, 1940

(Give beginning and end of period, if less than a month.)

3. COMMAND

(Here specify the command, and the elements, companies, and detachments composing it on the last day covered by the report, together with either the tactical division, Army corps, or field Army, or the territorial corps area or department, of which it forms a part.)

The 32d Medical Battalion (Separate) composed of Companies "A", "B", "C", and Headquarters and Service Company; Company "A", 40th Ambulance Battalion (Animal Drawn); Band, M.F.S.S.; Detachment, Medical Department; Detachment, Finance; Detachment, Ordnance; Detachment Quartermaster; Detachment Company "D", 80th (Light Maintenance) Quartermaster Battalion; Detachment, Signal Corps.

4. VARIATIONS IN COMMAND

(State important variations from the general composition of the command, as the arrival or departure of companies, giving the dates thereof respectively, and the names of accompanying medical officers. Reports relating to commands in the field should show the location of the principal camp occupied during the month, with the dates of arrival at and departure from each. When a hospital is opened or closed, or a Medical Department organization discontinued, during the period of the report, the fact and date thereof should be recorded and the orders directing it be cited.)

The Noncommissioned Officers' Class, composed of 91 enlisted men of the Regular Army and 13 National Guards, ended on October 31, 1940, with the return of those attending to their proper stations.

The 12 Reserve Officers and 5 National Guard Officers attending the Special Basic Class of officers at this station, graduated and returned to their proper stations October 8, 1940.

5. MEAN STRENGTH OF COMMAND FOR THE MONTH

(a) REGULAR ARMY				(b) TRAINING UNITS			
Officers.....	116	White enlisted.....	774	N. G. Com.*.....	1	E. R. C.*.....	
W. O.*.....	2	Colored enlisted.....		N. G. Enl.*.....	13	C. M. T. C.*.....	
F. C.*.....		Filipino enlisted.....		R. O. T. C.*.....			
A. N. C.*.....		Puerto Rican enlisted.....		O. R. C.*.....	3		
Res/BAD/Off.....	8						
		Total.....	900			Total.....	17
(c) Civilians not included in (b): Men.....				77	Women.....	200	Children.....
						230	Total.....
							507

(For method of computing the mean strength, see Instructions 5, reverse side of sheet. *Warrant officers. *Army field clerks and field clerks, Q. M. C. *Army Nurse Corps. *National Guard. *Reserve Officers' Training Corps. *Officers' Reserve Corps. *Enlisted Reserve Corps. *Citizens' Military Training Camp.)

6. PATIENT DAYS

	Hospital	Quarters		Hospital	Quarters
Regular Army, active list.....	659	152	R. O. T. C.....		
National Guard.....	2		XXXXX CCC.....	849	
Reserve Corps.....			All others Discharged.....	168	
Dependents of officers and enlisted men.....	41		Total.....	1719	152

7. PROFESSIONAL WORK (NOT OTHERWISE REPORTED)

	Number of patients	Number of treatments
(a) Out-patients: (1) Regular Army (5a).....	198	1104
(2) Training units (5b).....	0	0
(3) Civilians (5c).....	148	274
Total.....	341	1378

(b) Physical examinations conducted (specify; see instruction par. 9g, AR 40-1025):

Enlistment and discharge examinations - - - - -	85
Extended Active Duty, Final Type - - - - -	69
Induction National Guard - - - - -	35
Civil Service physical examinations - - - - -	4
Miscellaneous soldier examinations - - - - -	7
R.O.T.C. examinations - - - - -	4
Nurses' examinations for active duty - - - - -	9
Miscellaneous physical examinations for officers (63) - - - - -	2

(c) Vaccination and immunization, and sensitization tests administered (specify):

Smallpox - - - - -	109	A.T.S. - - - - -	12
Typhoid - - - - -	113	Pertussis - - - - -	4
Dick Test - - - - -	8		
Schick Test - - - - -	8		

*(d) Number of cases on syphilitic register in command - 11
8. BIRTHS, MARRIAGES, AND DEATHS

Births: One (1)
Date : October 19, 1940
Name : Josephine Anna Anderson
Sex : Female
Maiden name of mother : Anna Kristine Nødder
Name and rank of father: Joseph S. Anderson, Staff Sgt
Number of child : two (2)

9. GENERAL REMARKS

*Civilian employees, CCC: 11 are carried in space 5c under heading of men and 5 under heading of women.
**One (1) case added to the syphilitic register of command : Pvt 1 cl. Martin F. Polshi. 6897432, Det., Finance Department. Diagnosis made in September, confirmed and added to register October 1, 1940.

10. CERTIFICATE

I certify that this sheet and the accompanying cards are a true and correct exhibit of the sick and wounded of the command specified above for the period indicated. Cards of95..... completed cases and of11..... remaining cases on sick report longer than a month, and not previously reported, accompany this sheet.

....., U. S. Army,
THOMAS F. FURNESS, Major, M.C. Surgeon.

INSTRUCTIONS

- (a) The report of sick and wounded comprises the report sheet, Form 51; report cards, Form 52; emergency medical tags, Form 53; field medical cards, Form 54; and field medical record jackets, Form 55. (See par. 5, 6, 7, and 8, AR 40-1025.)
(b) Entries on the report sheet and report cards should be made in ink. Entries on medical tags should be made in ink or indelible pencil. Entries on field medical cards should be made in the field, when pencil is permissible. When a typewriter is used, the name of the officer signing this form and signing or initialing the report cards should be typed immediately below his signature or initials.
- See instructions in space 2 or par. 9(b), AR 40-1025.
- See instructions in space 3 or par. 9(c), AR 40-1025.
- See instructions in space 4 or par. 9(d), AR 40-1025.
- The mean strength will be computed as follows: The totals of strength for each day of the period will be added together by beds or items (colored, white enlisted men, colored enlisted men, civilians, etc., separately) and divided by the number of days in the month for which the report is made. The quotients are the mean strength by items. In cases in which the report is made for a period which is less than a month, the totals will nevertheless be divided by the number of days in the month. See also par. 9(f), AR 40-1025.
- See par. 9(g), AR 40-1025.
- See par. 9(h), AR 40-1025.
- See par. 9(i), AR 40-1025. Under GENERAL remarks record any facts of importance not otherwise provided for.
- See par. 9(j), AR 40-1025.

secure a satisfactory comparison of army accident statistics with those of the navy and of industry.

The sick and wounded report is sent to the surgeon general direct in case of exempted stations and in other cases through the corps area or department surgeon. It is held in the office of the surgeon general to extract data necessary in compiling vital statistics. Each individual report card is then sent to the Adjutant General where it is made part of the soldier's permanent War Department record.

1. REGISTER NO. 41145		4. A. S. NO.	
2. SURNAME		3. CHRISTIAN NAME	
Smith, John L.		6623790	
5. RACE	6. COMPANY	7. REGIMENT AND ARM OR SERVICE	8. AGE
Pvt	Det	QMC	21
9. RACE	10. RAYNETH	11. SERVICE	12. DATE OF ADMISSION
W	Pa	1-6/12	January 20, 1940.
13. SOURCE OF ADMISSION			
Command			
14. CAUSE OF ADMISSION			
Influenza, respiratory type, mild.			

15. LINE OF DUTY	
Yes	
16. INJURY CODE	
17. ADDITIONAL DIAGNOSIS, OPERATIONS	
January 25, 1940: Otitis media, acute, suppurative, right, L.O.D., Yes.	
January 26, 1940: Paracentesis, tympanum, right, 24 hours after onset. No anesthetic. L.O.D., Yes.	

18. PLACE OF TREATMENT	
Station Hospital, Fort McPherson, Ga.	
19. DISPOSITION	
Duty	
20. DATE OF DISPOSITION	
February 10, 1940.	
21. NAME OF HOSPITAL	
Station Hospital, Fort McPherson, Ga.	
22. SENT WITH REPORT OF S. & W. FOR MONTH BY	
February 1940.	
23.	
JOHN B. HALE	
Medical Corps, U. S. Army.	

Form 59
MEDICAL DEPARTMENT, U. S. A.
(Revised March 15, 1938)

9-9073

34. DAYS OF TREATMENT IN CURRENT CASE

YEAR 19.....	IN QUARTERS	IN HOSPITAL
January.....		12
February.....		9
March.....		
April.....		
May.....		
June.....		
July.....		
August.....		
September.....		
October.....		
November.....		
December.....		
TOTAL.....		21

Aggregate patient days..... 21

U. S. GOVERNMENT PRINTING OFFICE 9-9083

(Front side)

(Reverse side)

Plate 8. Sick and Wounded Report Card or Register Card.

Surgeon's Morning Report of Sick. (Par 6, AR 40-1005.) Each morning the senior medical officer of every command prepares a report of sick of the command on W.D., M.D. Form 71. The "day" covered by the report is computed as prescribed in paragraph 8, AR 345-400. Accordingly, the morning report of sick submitted by a surgeon on the morning of the 5th covers the 24-hour period ending the preceding midnight and exhibits entries under date of the 4th. Preparation is as follows: One line is filled out for each separate company or detachment comprising the command, and each column footed for

Form 86ab
MEDICAL DEPARTMENT, U.S. ARMY
(Authorized Dec. 22, 1933)

STATISTICAL REPORT

FIRST AND SECOND SECTIONS

* (A) Fort * (B) For day-week ending with morning report of Dec. 20, 1940,
(Station or designation of unit)

* (C) Mean strength of command during period covered by this report:

Officers 132 Nurses 0 Enlisted men 732 W.O. 3

PATIENTS		HOSPITAL AND QUARTERS		HOSPITALIZATION	
Date of last report <u>December 13</u> , 1940				BED STATUS	
NOTE {G=Sum of D, E, and F {G=Sum of H, I, J, K, and L		Disease	Injury	Battle casualty	
(D) Remaining from last report.....		12	2		(P) * (Pa) Normal beds..... 24
(E) * Admitted from command since last report.....		7	1		* (Pb) Emergency beds..... 19
(F) * Admitted by transfer or change of status since last report.....					* (Pc) Expansion capacity..... 17
(G) Total treated since last report.....		19	3		* (Pd) Vacant beds..... 14
(H) Returned to duty since last report.....		6			Beds occupied this date by:
(I) Transferred to other hospitals since last report.....					Officers..... 1
(J) Died since last report.....		1			Nurses..... 0
(K) Otherwise disposed of since last report.....			1		Enlisted men..... 8
(L) * Remaining to be accounted for on next report.....		12	2		Beneficiaries, Vet. Adm.....
					Other civilians, male..... 36
					Other civilians, female..... 1
				
					(Q) Total beds actually occupied..... 46

(M) Patients fit for evacuation to other hospitals should the necessity arise 49 (includes 3 in quarters)...

(N) * Killed in action since last report0..... (not to be included on line J).

(Z) * Causes of the deaths entered on line J ... Encephalitis

COMMUNICABLE DISEASES

[illegible]

Venereal cases from column (S):

"OLD"	"NEW"	"LONG"
1	1	1
2	2	2
3	3	3
4	4	4
5	5	5
6	6	6
7	7	7
8	8	8
9	9	9
10	10	10
11	11	11
12	12	12
13	13	13
14	14	14
15	15	15
16	16	16
17	17	17
18	18	18
19	19	19
20	20	20
21	21	21
22	22	22
23	23	23
24	24	24
25	25	25
26	26	26
27	27	27
28	28	28
29	29	29
30	30	30
31	31	31
32	32	32
33	33	33
34	34	34
35	35	35
36	36	36
37	37	37
38	38	38
39	39	39
40	40	40
41	41	41
42	42	42
43	43	43
44	44	44
45	45	45
46	46	46
47	47	47
48	48	48
49	49	49
50	50	50
51	51	51
52	52	52
53	53	53
54	54	54
55	55	55
56	56	56
57	57	57
58	58	58
59	59	59
60	60	60
61	61	61
62	62	62
63	63	63
64	64	64
65	65	65
66	66	66
67	67	67
68	68	68
69	69	69
70	70	70
71	71	71
72	72	72
73	73	73
74	74	74
75	75	75
76	76	76
77	77	77
78	78	78
79	79	79
80	80	80
81	81	81
82	82	82
83	83	83
84	84	84
85	85	85
86	86	86
87	87	87
88	88	88
89	89	89
90	90	90
91	91	91
92	92	92
93	93	93
94	94	94
95	95	95
96	96	96
97	97	97
98	98	98
99	99	99
100	100	100

Chancroid...	.....	.....	.....
Gonorrhea..	.....	.....	.....
Syphilis.....	.....	.....	.....

Theodore F. Prutell, Major M.C., U.S.A.
(Name) (Official designation) (Rank)
SURGEON

2-10343

SURGEON

Plate 9. Statistical Report (Front).

each day opposite the word "TOTAL" in the column "Company and Regiment or Corps." On the line immediately below the total for each date the medical officer signs the report, using one line only for his signature and title; after he has prepared and signed the report he forwards it promptly to the organization commander who enters in the proper columns the strength of the command for the day, present with the command (casualties included, absent not included, except in the case of general hospitals as indicated in paragraph 9.

GENERAL INSTRUCTIONS

(See AR 40-1080)

This report will be rendered by all Medical Department units in peace and war. In peace a separate report will be rendered for each character of training unit.

Form 86ab, unless otherwise directed by competent authority, will be rendered weekly to include data appearing on the morning report submitted on Saturday morning for the period ending the preceding midnight. Under exceptional circumstances, any part of the report may be required daily.

Channels through which rendered: In time of peace and in the zone of the interior in time of war, the statistical report will be made in triplicate; one carbon copy forwarded direct to The Surgeon General, U.S. Army, Washington, D.C.; the original copy to the corps area or department surgeon; and the second carbon copy retained; except that detachments, regiments, and other organizations forming part of a division, camp, or subordinate administrative district which renders a consolidated

report will render the report in duplicate only, forwarding the original to the next higher authority, who will consolidate the reports of units under his jurisdiction in triplicate and forward as directed above. (Par. 2e (1), AR 40-1080.)

In a theater of operations in time of war, the reports, unless otherwise directed by competent authority, will be made in triplicate, one carbon copy forwarded direct to the chief surgeon of the forces, the original through medical channels to such intermediate administrative office as may exist, and the second carbon copy retained; except that detachments, regiments, and other organizations forming part of a division, camp, or subordinate administrative district which renders a consolidated report will render the report in duplicate only, forwarding the original to the next higher authority, who will consolidate the reports of units under his jurisdiction in triplicate and forward as directed above for a theater of operations. (Par. 2e (2), AR 40-1080.)

SPECIAL INSTRUCTIONS

(Purpose of asterisk explained in AR 40-1080)

1. Officer, nurse, and enlisted patients only will be included in "Patients'" section.
2. In theater of operations give only the numerical designation of unit. In zone of the interior give complete identification by name and place.
3. Weekly mean strength is obtained by adding the seven daily strengths (officers, nurses, and enlisted men) and dividing by seven. Should there be officers, nurses, and enlisted men in the station, camp, or local hospital not included in the strength, they should be included.
4. Number on line "D" is same as reported on line "L" for the previous week.
5. In "Hospitalization" section NORMAL beds mean number authorized for which personnel and matériel are maintained. EMERGENCY beds mean number that can be maintained with present personnel and matériel and for which there exists shelter or tentage, and EXPANSION capacity means where there is shelter but no available personnel or matériel.
6. Under "died" do not enter killed in action.

7. In communicable disease section report any of the following diseases in the order given below:

*Cerebrospinal fever (meningococcus)	*Dysentery, unclassified
*Common respiratory diseases	*Typhoid fever
*Diphtheria	*Typhus-like fevers, types A and B
*Influenza	*Dengue
*Measles	*Malaria
*Scarlet fever, German	*Plague, bubonic
Mumps	*Relapsing fever
*Plague, pneumonic	*Typhus fever
*Pneumonia, primary	*Yellow fever
*Pneumonia, secondary	*Chancroid
*Polio-myelitis, acute	*Gonorrhea
*Scarlet fever	*Syphilis
*Tuberculosis, all forms	*Chickenpox
Vincent's angina	*Scabies
Whooping cough	*Smallpox
Cholera, Asiatic	*Tetanus
*Gonorrhea	*Special—not listed
*Dysentery, bacillary	Fever, still undiagnosed
*Dysentery, protozoal	

Include only officers, nurses, and enlisted men. Communicable diseases in others should be listed in remarks.

Remarks (V): G.C.C.

Tuberculosis	1
Gonorrhea	4
Syphilis	0

Communicable diseases among civilians on post.

Whooping cough	2
Chicken pox	1

Total patient days Regular Army.

	Hospital	Quarters	Total
Diseases	39	10	49
Injuries	9	7	16
Totals	48	17	65

U. S. GOVERNMENT PRINTING OFFICE 3-10243

Plate 10. Statistical Report (Reverse).

AR 40-1025), separately for officers and enlisted men, white (W.), colored (C.), Filipinos (F.), Puerto Ricans (P.R.), and Indian Scouts, and returns the report to the medical officer. Completed reports are preserved for a period of eight years, unless the command is sooner discontinued, when they are to be sent to the Surgeon General for disposition. (Par. 1c (3), AR 40-1005.)

Statistical Report (Form 86ab, M. D.). (See Plates 9 and 10.) For instructions as to the use of the statistical report see Plate 10.

Ward Management

Ward Officer. The professional service in the wards of military hospitals is similar to that in civil hospitals. Ward officers, however, have functions other than the strictly professional ones. A ward officer is responsible for the professional care and welfare of the patients of his ward, the preparation of all clinical records and reports, the discipline and the work performed by the duty personnel, and all property pertaining to the ward.

Responsibilities of Ward Assistants. The head nurse, or the ward master in wards to which Army nurses are not assigned, is directly responsible to the ward officer and, under him, has general supervision of the ward, the enlisted assistants, and patients, and is obeyed and respected accordingly. The head nurse (or the ward master) is responsible for the following: the administration of medicine and other treatment prescribed, the keeping of records, the cleanliness and order of the ward, the public property therein, the delivery of prescriptions to the pharmacy and of medicines to the ward, the delivery of diet cards to the mess officer, and the effects of the patients until they have been turned over to the proper custodian.

Ward Rules. The following are some of the ward rules in effect in Army hospitals:

No enlisted man except those authorized in writing by the responsible medical officer will administer medicine to a patient in hospital, and then only as directed under such limitations as his written authorization shall prescribe.

Active poisons, alcohol, and alcoholic liquors when necessarily on hand in the ward will be kept under lock and key.

Disinfectants and medicines for external use only will not be kept with medicines for internal administration.

Patients upon reaching the ward will be bathed, clothed in clean hospital clothing, and put to bed unless their condition indicates otherwise or a specific order forbids.

On the death of a patient the ward master will notify the ward officer or, in his absence, the medical officer of the day. He will not remove the body from the ward until after it has been examined by the medical officer.

Ward Morning Report. A morning report of the ward (Form 72 M. D.) is forwarded by the ward officer to the registrar each morning immediately after the morning rounds have been made. This report is accompanied by diagnosis slips for new admissions, by change of diagnosis cards, by the clinical records of all cases completed in the ward or which depart from the ward otherwise than by transfer to another ward, and by the notices of cases transferred to other wards since the preceding report.

It is important that the ward officer send in diagnosis slips promptly for all patients in order that the commanding officer and chief of service may be informed of the general type of cases being admitted to the hospital.

Diet Cards. Diet cards (Form 73 M. D.) covering the diet requirements for the ensuing 24 hours are sent by the ward officer to the mess officer each morning.

Clinical Record. A clinical record (Form 55a M. D.) is kept for every patient admitted to the hospital. (See Plate 11.) Upon departure of the patient from the hospital all the sheets of the clinical record are arranged in their proper order, signed by the ward surgeon, and sent to the registrar's office with the next morning's report of the ward. Should a patient be transferred from one ward of the hospital to another his clinical record is sent with him to the new ward and the fact of the transfer is noted.

Patient's Effects and Pay

Patient's Property. The clothing and other effects of every patient admitted to hospital are tagged (Form 76 M. D.) for identification and listed in duplicate on the patient's property card (Form 75 M. D.) in the presence of the patient. The list together with the effects is sent to a designated storeroom. Money and valuables belonging to patients are deposited in the hospital safe or in a bank by the commanding officer or officer designated by him, and the patient is given a proper receipt. Enlisted men on duty are forbidden to retain money or other valuables received from patients for safekeeping or to have financial dealings with them. The soiled clothing of patients is washed as a part

Pay of Patients. Patients at a station hospital are usually paid on their organization pay rolls, the money being collected by their company commanders and delivered to them. The commanding officer of a general hospital is also commanding officer of the patients therein and makes provision for their pay.

(a) cordd showing date of same, and anesthetic used.)
(The reverse side is used for completion of entries when there is not adequate space on the front side of form.)

U. S. GOVERNMENT PRINTING OFFICE 3-3670

Service Record of Patient Detached from His Organization. Whenever an enlisted man is detached from his organization for admission or transfer to a hospital, the soldier's service record is sent to the commanding officer of the hospital or station immediately following such admission or transfer. Service records of patients are not sent to the hospital so long as the organization to which they belong is stationed in the vicinity of the hospital.

Patients are disposed of as follows: discharged to duty; discharged to quarters to be

returned to duty later; discharged from the military service on certificates of disability; transferred to other hospitals; discharged from the Army for other cause (*e. g.*, expiration of enlistment); by death; by desertion.

Return to Duty. Patients previously designated by the word surgeon (or chief of service) as fit for duty are marked "duty" on the company sick books at the time of sick call and are returned to duty, usually immediately after breakfast. This day counts as a day of duty, and the organization takes credit for that day's ration. The hospital receives a ration for the day that patient was admitted.

Discharge for Disability. Enlisted men in the military establishment permanently unfitted for duty because of physical disability are discharged. They are retained and given treatment, however, until they have received the maximum benefit from it.

When an enlisted man in the hospital is considered a fit subject for such discharge, the surgeon notifies the soldier's immediate commanding officer. A certificate of disability is then initiated by the organization commander and forwarded to the commanding officer of the station. The latter refers the case to a board of medical officers. The board examines the man and reports the cause, nature, and extent of disability, and whether or not it was incurred in line of duty, for military purposes and in connection with compensation under war risk insurance act. If the board recommends discharge, the commanding officer forwards the papers to the corps area commander. The latter acts on the recommendations and directs the discharge if he approves. The discharge is effected by the soldier's immediate commanding officer who notifies the surgeon of the fact of discharge in order that the hospital records may be completed. The diagnosis or degree of disability is not quoted on the soldier's discharge papers, simply the fact. The certificate of disability is *not given to the soldier* but is forwarded to the adjutant general with a report of action. The surgeon general is notified by letter from the surgeon.

Enlisted men may also be discharged on recommendations of boards of officers because of inaptness, or undesirable habits or traits of character under Section VIII, AR 615-360. When the findings of such a board indicate that disqualification may be due to physical disability, the case is referred to a board of medical officers for action. If the latter finds that physical disability exists and is due to mental irresponsibility, the discharging authority usually directs discharge on certificate of disability. If the medical board finds no physical disqualification or if they find it to exist as the result of misconduct, discharge may be directed under "Section VIII, AR 615-360."

Care and Disposition of the Insane. The insane of the military service are discharged on certificate of disability. If entitled to compensation, care, and treatment, under the war risk insurance act they are discharged and cared for under direction of the Veterans' Administration. Those not so entitled are discharged from the Army and admitted to the government hospital for the insane (St. Elizabeths) if entitled to admission; otherwise they are delivered to relatives, friends, or civil authorities.

No person is transferred to a hospital for the insane or discharged as insane unless reported upon after a period of observation by a board of two medical officers, one of whom should if practicable be a neuropsychiatrist. In peace time it is customary to send all insane patients to general hospitals for disposition.

Disposition of compensable cases. Those requiring institutional care are sent to a hospital or to relatives or friends as determined by the Veterans' Administration. Those not requiring institutional care are discharged and the Veterans' Administration notified.

Disposition of non-compensable cases. Those requiring institutional care may be (1) Discharged and placed in care of relatives or friends; (2) transferred to St. Elizabeths if admission is authorized; or (3) discharged and turned over to civil authorities legally required to assume care.

Those not requiring institutional care are discharged and liberated; relatives, friends, or civil authorities are then notified.

Authority to discharge from the service.

(a) *Compensable.* Corps area commander.

(b) *Non-compensable.* Those who are entitled to care and treatment at United States expense are reported to the adjutant general. Those not entitled to care and treatment are sent by direction of corps area commander to relatives, friends, or civil authorities.

An insane applicant for enlistment after acceptance, if liberation would be dangerous, is sent by the commanding officer to authorities legally authorized to apply for commitment.

Transfers to Other Hospitals. Patients may be transferred from one hospital to another for observation or to obtain better treatment or hospital accommodations. Transfers are directed usually by the corps area commander on recommendations made by the surgeon of the station having patients to be transferred. Except in the theater of operations in time of war, such patients are accompanied by a clinical record in brief and a transfer card. The latter is a duplicate of the sick and wounded report card (Form 52 M. D.). In the theater of operations patients transferred from one hospital to another are accompanied by their field medical records. (See Chapter III.)

Deaths. Whenever a death occurs in a military hospital the hospital commander reports the facts to the station commander in writing, also to the deceased's immediate commander. If the deceased has been a member of the military service, a statement is required as to whether or not death occurred in line of duty and whether death was or was not the result of the individual's own misconduct. In case of doubt as to the line of duty status or if death was due to violent or unknown causes (except in battle) a board of officers is convened by the station commander to investigate the circumstances. If the hospital commander is also the station commander, (*e. g.*, a general hospital), he also renders the reports required of a station commander in cases of death. These include reports to the adjutant general and notification of the death to the relative or person designated to be notified in case of emergency.

Preparation of remains. The surgeon is responsible that the remains are prepared properly; his responsibility does not cease until the remains are removed for burial or shipment. In all cases a medical officer inspects the remains after they are prepared and makes a certificate as to the identity of the body and whether it is properly clothed. The quartermaster is responsible for the shipment and burial of the remains.

Autopsies. In the military service autopsies may be performed when, in the opinion of the surgeon, they are necessary to determine the cause of death.

Pharmacy Management

A commissioned officer is given general supervision of the pharmacy in addition to his primary duties, and a responsible noncommissioned officer or experienced technician (pharmacist) is placed in direct charge.

Pharmacy Supplies. Supplies for the pharmacy are drawn from the medical supply officer daily or at stated intervals. Issues to the wards and departments of the hospital are made daily upon prescriptions and requisitions.

The metric system is generally used in writing prescriptions and in keeping records.

Prescription Files. Three prescription files are maintained: one for alcoholics and narcotics; one for prescriptions for civilians, containing drugs other than alcoholics and narcotics; and one for routine prescriptions.

Record of Alcoholics and Narcotics. An accurate record is kept of all alcoholics and narcotics received and expended. This is verified at least every month by a medical officer. Poisons, alcoholics, and habit-forming drugs are kept in separate lockers and issued only on order of a medical officer.

Civilian employees may purchase medicine when prescribed by a medical officer. Funds so collected are deposited at the end of every month with the nearest finance or disbursing officer for deposit in a United States depository to the credit of the Treasurer of the United States under the special fund "Replacing medical supplies," for the next succeeding fiscal year; for example, those deposits made in the fiscal year 1939 revert to the appropriation for the fiscal year 1940. A report of "Proceeds of sales of medicines to civilians" is rendered by the responsible officer by letter direct to the surgeon general.

Sales of Medicines to Civilian Employees. United States civil employees injured while on duty are entitled to first aid, medical care, and treatment in established institutions of the Army under the employees' compensation act. No charges for medicines, drugs, etc., to the patient are made therefor, but bills are sent to the United States Employees' Compensation Commission, Washington, D. C.

Dental Administration

Dental Reports. The senior dental officer of a command or station is responsible to the surgeon for the preparation, authentication, transmission, and safekeeping of the reports, returns, and records prescribed for the Dental Corps. (AR 40-1010.)

The *dental history* of the station is maintained at each station in the zone of the interior where a dental officer is on duty. It is a monthly compilation of records of dental activities of the station or command consisting of the retained copies of reports and records, as follows:

Monthly report of dental service (Form 57 M.D.).

Statement of expenditures of special dental materials (Form 18b M.D.).

Reports of dental opinions on clinics.

Schedules of instruction for enlisted assistants.

Memoranda recommended for incorporation in sanitary orders.

Special reports and articles for publication.

Such other data as are deemed pertinent.

At the close of each month, and upon completion of all reports required for the month, the retained copies referred to above are fastened together and filed as "Dental history, Fort _____, _____, for the month of _____." At the close of each year an index of items included in the history is prepared and filed.

A *monthly report* of dental service is required from each military station and separate command where a dental officer has been on duty during the month. The dental surgeon signs this report. It is rendered on Form 57 M.D. and is a compilation of dental activities for the period. If more space is required additional sheets may be attached. It includes:

Station or command with location, date, and period covered.

All stations or commands from which patients were regularly drawn and the military strength of each.

Total number of admissions to the dental clinic for routine treatment, military personnel and others, separately.

Total number of admissions to the dental clinic for emergency treatment, military personnel and others, separately.

Total number of sittings given, military personnel and others, separately.

Initial classification for the period, additional classification and change in classification during the period, final classification at close of period; total in each class, military personnel only.

Diagnoses made; operations performed; total number of each, military personnel and others, separately.

Number of dental officers on duty and total days of duty.

Name, grade, special qualification, rating, and efficiency of each enlisted man on duty in the dental clinic.

General remarks.

Each month a *report of the expenditures* of special dental materials is required (Form 18b M.D.) from each military station or separate command where a dental clinic with laboratory facilities is established and a dental officer is in attendance. The report is rendered whether or not special dental materials have been expended during the period covered by the report. It is signed by the dental surgeon or dental officer responsible for dental materials. It contains an accurate account of the dental materials expended during the period. The name and status of the persons for whom expenditure is made, appliances used, and amounts of special dental materials expended are shown in each case. Amounts of special dental materials on hand at last report, amounts received, amounts expended, and amounts remaining on hand at the close of the period are entered together with such other explanatory remarks as may be necessary.

Both the monthly report of services and the monthly statement of expenditures are forwarded through medical channels before the fifth day of the next succeeding month, sufficient copies being furnished to permit retention of carbon copies in the intermediate offices of transmission, as follows:

From any station or command under the immediate control of the War Department directly to the Surgeon General, unless otherwise ordered by him.

From any other organization, station, or hospital to the chief surgeon of an expeditionary force in a theater of operations, or to the surgeon of the corps area or department, for transmission to the Surgeon General.

A full record of dental patients at every military station or separate command where a dental officer is on duty is made on register cards, Form 79 M.D. For authorized abbreviations and diagnoses see pars. 6 and 7, AR 40-1010. These cards collectively form the dental register, each card being a case record. When a patient is confined to quarters or hospital as a result of dental conditions, the dental surgeon is required to furnish the surgeon with a duplicate of the case record on Form 79 M.D. It is then incorporated in the patient's clinical record.

Veterinary Administration

Veterinary Reports. The senior veterinary officer of a station or other command is responsible for the preparation, authentication, transmission, and safekeeping of the reports, returns, and records prescribed for the use of the Veterinary Service. In the absence of a veterinary officer, the surgeon takes charge of veterinary property and renders all reports pertaining to the veterinary service unless otherwise specifically excepted. An attending veterinarian or a civilian veterinarian rendering professional service to a command will, in the absence of a veterinary officer, sign or initial (if the name is typed in) register and report cards of sick and wounded animals.

A *veterinary history* of each permanent station is kept by the veterinarian in a loose-leaf binder. A copy of the veterinary sanitary report (AR 40-2255), the meat and dairy hygiene report (AR 40-2260), the forage inspection report (AR 40-2085), and the veterinary report of sick and wounded animals (AR 40-2245) is filed therein in a single chronological sequence. Additional sheets, measuring about 13 by 8 inches, for noting the occurrence of epizootic diseases and other data of general and veterinary interest are inserted as occasion requires at their proper chronological places. The prescribed endorsements on sanitary reports and W.D. Form No. 110 (Report of Veterinary Meat and Dairy Hygiene and Forage Inspection) are invariably made on the copy filed in the veterinary history.

A *clinical record* (Form 55 M.D., modified) is kept for each patient in a veterinary hospital establishment. W.D. Form No. 55aV (Clinical Record Brief, Veterinary) and W. D. Form No. 55j (Clinical Record, Treatment) are used in every case; the other lettered blanks of W.D. Form 55 M.D. are used as the nature or importance of the case may warrant. Upon completion of the case all the sheets of the clinical record are arranged in their proper order, fastened together at the top, all entries completed, and the record signed by the ward veterinarian. The record as completed is then sent to the hospital office with the next morning report of the ward. It is filed according to the register number thereon.

A *report of veterinary personnel* is rendered monthly on W.D., M.D. Form No. 86c (Statistical Report, Third Section—Personnel and Transportation), in accordance with section IV, AR 40-2245.

The table on the following pages includes only the reports and returns required by Army Regulations pertaining to the Veterinary Service.

Name of report, etc.	W. D., M. D. Form No.	Num- ber of copies	To whom sent	Reference and remarks
a. Daily				
Veterinarian's morning report of sick animals.	71V-----	1	Commanding officer -----	Paragraph 21, A R 40-2035. Made after veterinary sick calls. Returned by the adjutant to the veterinary hospital.
Report of meat and dairy hygiene.	110-----	1	Filed in office -----	Paragraph 1, A R 40-2260. On days that no inspections are made, no report is required.
Daily report of forage inspected.	110-----	1	-----do-----	Paragraph 9, A R 40-2085. On days that no inspections are made, no report is required.
Physical examination of animals.	109-----	2 or 3	Filed in office until end of month.	Paragraph 1, A R 40-2265. On days that no inspections are made, no report is required.
Ward morning report ---	72-----	1	Forwarded to hospital office.	Paragraph 28, A R 40-2005.
b. Monthly				
Veterinary statistical report; personnel.	86c-----	3	One to the Surgeon General direct; one to corps area surgeon; one retained.	Section IV, A R 40-2245.
Veterinary report of sick and wounded animals.	102, 115----	3	One to the Surgeon General through corps area surgeon; one retained; one to corps area surgeon.	A R 40-2245.
Report of meat and dairy hygiene.	110-----	2	One to commanding officer through the surgeon; one retained.	A R 40-2260. Prepared by compiling data from daily reports.
Report of forage inspected.	110-----	2	Part of report of meat and dairy hygiene.	A R 40-2085. Prepared by compiling data from daily reports.
Report of physical examination of animals.	109-----	2 or 3	One to the Surgeon General through military channels; one to headquarters veterinarian; one retained.	A R 40-2265. Made by assembling chronologically daily reports of inspection.
c. Quarterly				
Veterinary sanitary report.	Letter-----	4	Two to commanding officer; one to station surgeon; one retained.	A R 40-2255; paragraph 6b, A R 40-2090.
d. Annually				
Report of corps area veterinarian.	-----do-----	2	One to corps area surgeon for transmission to the Surgeon General; one retained.	Paragraph 7, A R 40-2015.
Report of veterinary activities at laboratories.	-----do-----	2	-----do-----	Paragraph 5, A R 40-2140.
Report of veterinarian, purchasing and breeding headquarters.	-----do-----	2	One to the Surgeon General through military channels; one retained.	Paragraph 12, A R 40-2045.
e. Occasionally				
Veterinary health certificate.	101-----	3 or 4	One or two to receiving veterinarian; one to shipping officer; one retained.	Paragraph 2, A R 40-2270. Prepared by the veterinarian of the issuing station.
Veterinary health certificate (memorandum section).	Letter-----	1 or 2	One completed and retained; one completed and forwarded to the Surgeon General through military channels.	A R 40-2270. Memorandum section completed by receiving veterinarian.
Veterinary sanitary report of animal transport.	103a-----	2	One to the Surgeon General through military channels; one retained.	A R 40-2055. Prepared by port veterinarian.
Trip report veterinary transport service.	113-----	2	One to officer in charge; one retained.	A R 40-2060. Prepared by transport veterinarian.
Special report of transport veterinarian.	Letter-----	2	One to port veterinarian; one retained.	Paragraph 9b, A R 40-2060. Report of personnel, supplies, etc.

Name of reports, etc.	W. D., M. D., Form No.	Num- ber of copies	To whom sent	Reference and remarks
e. Occasionally—Contd.				
Report of personnel accompanying shipment of animals.	---do---	2	One to the Surgeon General through military channels; one retained.	Paragraph 25, A R 40-2035.
Report of appearance of first case of serious communicable disease.	---do---	3 to 6	One to corps area surgeon; one to the Surgeon General (from units within continental United States); one to issuing veterinarian (if among animals received from another station); one to receiving veterinarian (if contact animals have been shipped); one to commanding officer; one retained.	Paragraph 5, A R 40-2090.
Notification of communicable diseases to civilian authorities.	Letter or such form as desired by civil authorities.	2	One to civil authorities; one retained.	Paragraph 7, A R 40-2090.
Special professional reports of epizootic diseases and other interesting cases.	Letter	2	One to the Surgeon General through medical channels; one retained.	Paragraph 6c, A R 40-2090.
Certificate of examination of officer's mount.	---do---	2	One to officer requesting examination; one retained.	Paragraph 25, A R 40-2075.
Veterinary opinion on hospital buildings.	---do---	2 or 3	One to commanding officer; one to the Surgeon General through military channels; one retained.	Paragraph 9, A R 40-2065.
Request for alteration or addition to hospital.	---do---	2	One to the Surgeon General through military channels; one retained.	Paragraph 10, A R 40-2065.
Chart of tuberculin test	---do---	2	One attached to report of meat and dairy hygiene; one retained.	Paragraph 40h, A R 40-2230.
Autopsy protocols	---do---	2	One to curator, Army Medical Museum, through medical channels; one retained.	Paragraph 20, A R 40-410.
Clinical record	Form 55 series.	1	Filed in hospital office	Paragraph 8.
Receipt for patients	116	2	Original furnished organization presenting patient; duplicate filed.	Paragraph 34, A R 40-2065.
Emergency veterinary tag	E. V. T.	3	For use in the field; original attached to patient; at the end of the month duplicates will be forwarded to corps area or chief veterinarian for transmittal to the Surgeon General; triplicate retained.	Paragraph 39, A R 40-2245.
Index card	115a	1	Filed at station	Paragraph 5b, A R 40-2245.

ADMINISTRATION OF MEDICAL UNITS

General. The purpose of the information which follows is to present illustrative material and explanatory memoranda about the preparation of required forms and records which pertain to the administration of any military unit. They are used within Medical Department units in the same manner and for the same purposes as in all branches of the service. The records described pertain particularly to the routine administrative requirements of the company, such as a company which constitutes a part of a medical regiment, or more commonly a medical detachment of a station hospital. The same methods would be applicable to the medical detachment of an infantry or artillery regiment, or to medical detachments of other field forces.

The company is an important administrative unit because many of the records which it maintains are records of original entry. They include the soldier's individual service record, the morning report, duty roster, sick report, payrolls, personnel reports, and correspondence which pertains to the company. In addition there are mess records and

"Remarks" section. The "remarks" section is provided for the purpose of recording all changes of duty and status of officers and enlisted men by name. If there is no change of status, the notation "No change" is entered. (See Plate 13.)

Practically everything that happens officially to a member of a company will be covered under "Remarks." Some of the more important entries will be: changes in commands,

Day of month	REMARKS
1	CORP SMITH DUTY TO FUR 15 DAYS. PVT GREEN DUTY TO AWOL 3 PM <i>OK</i>
2	<i>OK</i> NO CHANGE <i>OK</i>
3	<i>OK</i> PVT JONES FR. DUTY TO DS AT FT. MOULTRIE, S.C. LEFT CO. 1 PM <i>OK</i>
4	<i>OK</i> 2 THIEV HERRY ASGD TO AND TO CO. PVT WHITE DUTY TO FUR 10 DAYS <i>OK</i>
5	<i>OK</i> PVT GREEN FUR TO DUTY. CAPT BLUE DUTY TO LV 3 DAYS. PVT GREEN
6	<i>OK</i> AWOL TO DUTY 8 AM <i>OK</i>
7	<i>OK</i> NO CHANGE <i>OK</i>
8	<i>OK</i> CORP DOE DUTY TO HOSP 4 PM PVT BLACK DUTY TO AWOL 3 PM <i>OK</i>
9	<i>OK</i> CAPT BLUE LV TO DUTY, PVT JONES DS AT FT. MOULTRIE TO DUTY
10	<i>OK</i> 8 AM <i>OK</i>
11	<i>OK</i> NO CHANGE <i>OK</i>
12	<i>OK</i> PVT ICL MURPHY APTD CORP. PVT THOMAS DUTY TO FUR 30 DAYS.
13	<i>OK</i> PVT JAMES ASGD TO AND TO CO 3 PM <i>OK</i>

Plate 13. Model "Remarks" Section of the Morning Report.

changes in the duty status of members of the company, such as discharges, change in grades, transfer, absences, furloughs, arrest, confinement, sick, and changes in grade or specialists' ratings. As examples:

Change in command: "Capt. Doe, duty to hosp; Lt Smith assumed command."

Discharges: "Pvt Jones, duty to disch."

Transfers: "Sgt Smith, trfd to 15th Inf."

Day of month	STATION AND RECORD OF EVENTS
1	FORT BENNING GA. COMPANY ORDERED TO ACTIVE DUTY. INITIAL CADRE OF THE COMPANY ASSIGNED TO AND REPORTED FOR DUTY. DUTIES IN CONNECTION WITH PREPARATION FOR RECEPTION OF SELECTIVE SERVICE MEN.
2	FORT BENNING GA. ONE HUNDRED SELECTIVE SERVICE MEN RECEIVED. USUAL DUTIES IN CONNECTION WITH ORGANIZATION OF COMPANY.
3	FORT BENNING GA. USUAL CAMP DUTIES AND COMPLETION OF ORGANIZATION OF COMPANY.
4	FORT BENNING GA. ORGANIZATIONAL EQUIPMENT DRAWN PERSONNEL OF COMPANY EQUIPPED.
5	FORT BENNING GA. USUAL CAMP DUTIES INCLUDING TRAINING OF COMPANY.

Plate 14. Model "Station and Record of Events" Section of the Morning Report.

Absences: "Sgt Pore, duty to fur 6 days." "Pvt King, duty to AWOL 3 P. M."

Arrest: "Corp Henry, duty to ar."

Confinement: "Pvt Ball, duty to conf."

Sick: "Sgt Smith, duty to sk in qrs."

Change in grade: "Pvt Doe aptd corp." "Pvt James rated specl 4cl."

"Station and record of events" section. The station and record of events section will be found in the last few pages of the morning report form. Here are entered remarks

in reference to the location of the company and such events as may take place, such as changes of station, with dates and distance marched or traveled; engagements including names, places; the dates of those killed, wounded or missing in action; and such other items of interest relating to the company. (See Plate 14.)

MEN MESSING WITH ORGANIZATION

DATE	Daily Average Strength for Rations	No. Men Messing with Organization	+ or - Correction for Percentage	Net No. Rations Due Organization
1	9	9	-	9
2	109	109	-	109
3	106	104	-	100
4	103	103	-	103
5	103	103	-	103
6	103	103	-	103
7	103	103	-	103
8	102	102	-	102
9	101	101	-	101
10	101	101	-	101
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				
24				
25				
26				
27				
28				
29				
30				
31				

TOTAL RATIONS DUE ORGANIZATION: 934

RATION ACCOUNT

VALUE OF ONE RATION DURING MONTH, \$ 3876

MEN AUTHORIZED TO MESS SEPARATELY

NAME AND GRADE	PERIOD	NO. OF RATIONS
NONE		

Number of rations commuted.....	
Ten per cent addition.....	
Total.....	
Total commutation due men messing separately \$.....	

Plate 15. Model "Ration Account" Section of the Morning Report.

"Ration account" section. A ration is the allowance for the subsistence of one individual for one day; i. e., it provides for three full meals for one person. The money value of the ration to be credited to a company fund depends upon the daily average strength of the company mess during the ration period; therefore, it is of paramount importance that a careful record is kept of the ration account each day.

The daily average strength of rations is the number of persons for whom the company is entitled to subsistence. This is found by dividing by three the total number of meals (breakfast, dinner and supper) served in the company, as shown by the figures in the strength section of the morning report and supported by the entries in the remarks section. The daily average for rations, less the number of men authorized to mess separately, gives the entries for the column headed "No. men messing with organization." (See Plate 15.)

Authorized abbreviations. The list of abbreviations given below is a partial list of those authorized by AR 850-150 for use in connection with morning reports, pay rolls, rosters, returns, and other military records, and no others are authorized except some exceptional cases which do not fall within the purview of this chapter:

Absent without leave	AWOL	Inclosure	Incl
Acting	Actg	Indorsement	Ind
Appointed	Aptd	Infantry	Inf
Army Regulations	AR	Infantry Reserve	Inf-Res
Arrest	Ar	Inspected and condemned	IC
Article of War	AW	Inspector General	IG
Assigned	Asgd	Inventory and Inspection Report ...	I & I Report
Attached	Atchd	Joined	Jd
Authorities	Auth	Leave of absence	Lv
Barracks	Bks	Lieutenant	Lt or Lieut
Battalion	Ba	Lieutenant Colonel	Lt Col
Brigade	Brig	Line of duty	LD
Bugler	B:lr	Machine gun	MG
Caliber	Cal	Major	Maj
Captain	Capt	Major General	Maj Gen
Casual	Cas	Manual for Courts-Martial	MCM
Changes	C	Marksmen	Mm
Circular	Cir	Medical	Med
Citizens' Military Training Camp	CMTc	Medical Corps	MC
Civil authorities	C.Auth	Memorandum	Memo
Class	Cl	Motor transport	MT
Coast Artillery Corps	CAC	Mounted	Mtd
Colonel	Col	National Guard	NG
Commanding	Comdg	Officer of the day	OD
Commanding General	CG	Olive drab	Ol
Commanding Officer	CO	Orders	O
Company	Co	Organized Reserves	OR
Confined or Confinement	Conf	Over, short and damaged	OS&D
Cook	Ck	Paragraph	Par
Corporal	Corp	Pay roll	P/R
Corps Area	CA	Post Exchange	PEX
Corps of Engineers	CE	Private	Pvt
Corps of Engineers Reserve	Engr-Res	Private, first class	Pvt 1cl
Current series	cs	Professor of Military Science and Tactics	PMS&T
Detached Enlisted Men's List	DEML	Quartermaster	QM
Detached Officers' List	DOL	Quartermaster Corps	QMC
Detached service	DS	Recruit	Rct
Discharge	Disch	Reduced	Rd
Dishonorable discharge	DD	Reenlistment	Reel
Dismissed	Dismd	Regiment	Regt
Disrated	Disr	Regular Army	RA
Distinguished Service Cross	DSC	Relieved	Reld
Division	Div	Reserve	Res
Document	Doc	Reserve Officers' Training Corps	ROTC
Enlisted	Enl	Retired	Ret
Excellent	Ex	Same date	Ed
Expert rifleman	ER	Second	2d
Expiration of term of service	ETS	Sergeant	Sgt
Field Service Regulations	FSR	Special Court Martial	SCM
Final statement	FS	Special Duty	SD
Finance Department	FD	Specialist	Spec
First	1st	Special Orders	SO
First class	1cl	Station	Sta
From	fr	Student	stud
Furlough	Fur	Summary Court	SC
General	Gen	Training Regulation	TR
General Court-Martial	GCM	Transferred	Trfd
General orders	GO	Unassigned	Unasgd
General Staff Corps	GSC	Verbal orders	VO
Grade	Gr	Very good	VG
Headquarters	Hq	War Department	WD
Hospital	Hosp	Warrant officer	WO

The Sick Report. *Sick call* is a daily or routine performance in the military service. It is held by a medical officer and usually takes place in the early morning. Officers or enlisted men of an organization who are in need of medical attention have their names, rank and serial number entered on the sick book of their organizations, and at the proper time report to the medical officer conducting sick call. In the case of enlisted men, they are grouped together and marched under a noncommissioned officer to the infirmary or other

designated place. The noncommissioned officer carries the sick book with him. In the case of an emergency it is not necessary for an individual to wait for sick call; he may be sent to the hospital at any time, or if he is unable to go to the hospital, a medical officer will call to see him.

A sick book, like a morning report, is a vital record of the company and consequently no erasures are permitted. If the company commander makes an error he will line out the error and initial it.

ORGANIZATION OR DETACHMENT COMMANDER'S REPORT						MEDICAL OFFICER'S REPORT	
DATE 1938	LAST NAME—FIRST NAME—MIDDLE INITIAL	ARMY SERIAL NO.	GRADE	WHEN TAKEN SICK	IN LINE OF DUTY (Yes or No)	IN LINE OF DUTY (Yes or No)	DISPOSITION
MAY 1	BURK HENRY	56472	PVT	5/1/38	YES	YES	HOSP
	JONES GEORGE H	66542	PVT	5/1/38	YES	YES	DUTY
	SMITH ALBERT L	445641	PVT	5/1/38	NO-AR	NO-AR	HOSP
	<i>Henry Gyer Capt 392^d Inf. Comdg.</i>				<i>John T.</i>		<i>Smith Major MC</i>
MAY 2	BURK HENRY	56472	PVT	5/1/38	YES	YES	DUTY
	SMITH ALBERT L	445641	PVT	5/1/38	NO-AR	NO-AR	HOSP
	O'CONNOR JOHN L	66475	PVT	5/2/38	YES	YES	HOSP
	HARRISON RAY D	675432	PVT	5/2/38	YES	YES	DUTY
	<i>Henry Gyer Capt 392^d Inf. Comdg.</i>				<i>John T.</i>		<i>Smith Major MC</i>

Plate 16. Model "Daily Sick Report."

8-5776

Organization commander's report. When a man's name is entered on the sick book the company commander enters in the proper column whether or not he believes the sickness originated "in line of duty," that is, not through the misconduct of the soldier and as a result of performance of duty. The company commander should be careful about making this entry; if he is not sure he should indicate it by a question mark. When all entries are made the company commander will sign the page immediately under the last entry. (See Plate 16.)

Medical officer's report. The medical officer's space on the sick book has two sections: a column headed "In line of duty," and one headed "Disposition." The medical officer

No.	RANK.	NAME.	NATURE OF DUTY AND WHEN LAST PERFORMED.					
			Charge of Quarters and Room Orderly.	Fatigue.	Kitchen Police.			
1	1 st SGT	STERN						
1	SGT	STILLWELL	MAY 24 8 30	APR 5 10				
2		RANDALL	MAY 25 2 9	APR 8 11				
1	CORP	PUCKETT	MAY 3 14 15	APR 8 14				
2		LAWRENCE	MAY 4 14 16	APR 9 15				
3		PETERSON	MAY 5 14 17	MAY 6 18				
1	PVT ICL	KING		MAY 8 19	MAY 2 8			
2		BARDER		MAY 9 20	MAY 2 8			
3		JEFFERSON		MAY 20	MAY 3 9			
1	PVT	CODD		MAY 9 21	MAY 3 9			
2		FLANAGAN		MAY 16 22	MAY 4 10			
3		HANNAH		MAY 15	MAY 4 10			
4		FLEMMING		MAY 11 21	MAY 5 11			
5		NORWOOD		MAY 16	MAY 5 11			

8-1336

Plate 17. Model "Roster for Other Duties."

fills these out and signs them at the place of holding sick call. In the column "In line of duty" he enters the remark, "Yes" or "No," according to his decisions; in column "Disposition" he enters the appropriate remarks, such as "Hospital," "Duty," or "Quarters."

Duty Roster. General. There are many factors which contribute to morale in any organization. One of these is the insuring that no member of the company is required

to perform more than his share of the various tasks incident to the functioning of the company. In order to insure that this principle is carried out each company keeps a "Duty Roster." This roster should be carefully kept, otherwise it may give rise to a great deal of dissatisfaction.

The duty roster is a list of the enlisted men by name, together with a record of the duty performed by each. The roster is divided into two parts, that pertaining to guard duty and that pertaining to other duties. Normally, details are so made that the man longest off any particular duty is the first available for that duty.

Other duties section. The *Roster for Other Duties* covers details other than for guard. At the beginning of the month there is inserted in the proper column, opposite each man's name, the date when he last performed the duty specified, as indicated in Plate 17. When a man is again detailed for the same duty, a line is drawn through the last date on which he performed that duty and the new date is inserted.

Guard duty section. In connection with the *Guard Roster Section* of the duty roster there are certain mandatory abbreviations which must be used. They are as follows:

A	.....	Absent without leave.
Ar	.....	Arrest in quarters.
C	.....	Confinement.
DS	.....	On detached service.
F	.....	On furlough.
P	.....	On pass.
Rct	.....	Recruit.
SD	.....	On special duty.
Sk	.....	Sick.

In keeping the *Guard Roster Section*, if a man is available for guard duty, there is placed opposite his name the number showing the number of days since he performed guard duty. If a man is in arrest, in confinement, or absent without leave, he is considered available for guard in computing the number of days since he performed guard duty. (See Plate 18.) This is not true, however, if the man is sick, on furlough, or on detached service.

GUARD ROSTER.																															No.	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31		
/	1	2	3	4	5	6	/	1	2	SK	SK	3	4	5	6	/	1	2	3	4	F	F	F	F	F	F	F	F	5	6		
/	1	2	3	4	5	6	/	1	2	3	4	5	6	/	1	2	3	4	5	6	/	1	2	3	4	SK	SK	SK	5			
/	1	2	3	SK	SK	4	5	6	/	1	2	3	4	5	6	/	1	2	3	4	5	F	F	F	F	F	F	/	1	2		
/	1	2	3	4	5	6	/	1	2	3	4	5	/	1	2	3	SK	SK	4	5	6	7	/	1	2	3	4	5	6	/		
/	1	2	3	4	5	/	1	2	F	F	F	F	3	4	5	6	/	1	2	3	4	5	/	1	2	3	4	5	/			
/	1	2	3	4	/	1	2	SK	SK	SK	3	4	/	DS	DS	DS	DS	DS	DS	1	2	3	4	/	1	2	3	4	5	/		
/	1	2	3	4	/	1	2	3	4	/	1	2	3	4	/	1	2	3	4	5	/	1	2	3	4	5	6	/	1	2		
/	1	2	3	4	/	1	2	3	4	/	1	2	3	SK	4	/	1	2	3	4	/	SK	1	2	3	4	/	1	2	3		
/	1	2	3	4	5	6	/	1	2	C ³	C ⁴	C ⁵	/	1	2	3	4	5	6	/	DS	DS	DS	DS	DS	DS	DS	DS	DS	DS		
/	1	2	3	4	5	6	/	1	2	3	4	5	/	1	2	3	4	5	6	/	1	2	SK	SK	3	4	5	6	7	/		
/	1	2	3	4	5	6	/	1	2	3	4	SK	SK	5	/	1	2	3	4	5	6	7	/	1	2	3	4	5	6	7	/	
/	1	2	3	4	5	6	/	1	2	3	4	5	6	/	1	2	3	4	5	6	7	/	1	SK	SK	2	3	4	5	/		
/	1	2	3	4	5	6	/	1	2	A ³	A ⁴	A ⁵	C ⁶	C ⁷	C ⁸	C ⁹	C ¹⁰	C ¹¹	C ¹²	DISCHARGED												

Plate 18. Model "Guard Roster."

Allotment of Pay. *Definition.* Allotment as used in the military sense means a definite portion of the pay of an officer or soldier which is authorized to be paid to another person, or institution, in a manner prescribed by the Secretary of War. The purposes for which allotments may be made are covered in *Army Regulations*. When an officer or soldier makes an allotment it is purely a voluntary act on his part and he may revoke the allotment at any time he may so desire, or at any time he may make any change he desires as to the monthly rate or period covered by the allotment.

Classes. Allotments must be made out on War Department, A. G. O. Form No. 29 and must comply with the regulations as set forth in AR 35-5520. Allotments are of two classes: "Class E Allotments" and "Class D Deductions." In general, Class E allot-

ments cover those made for the support of a wife, children, or dependent relative, and for the payment of premiums on commercial life insurance, while Class D deductions are made for the payment of premiums on government insurance.

Deductions. When allotments become effective the amount allotted is deducted each

Page 2

NAMES, PRESENT AND ABSENT, GRADE, AND SERIAL NUMBER			DATE OF ENLISTMENT	No. Yrs. Ser.	Spec. Rat- ing	ALLOWANCES		DEDUCTIONS		
						Subs.	Qrs.	Gov't Ins. Cl.-D	Allowment Cl.-E and Code	Gov't Laundry
<u>FIRST SERGEANT</u>										
1									(99)	
2	Eskridge, John T.	R-45128	Feb 10/40	20				11.75	15.00	
3	DSC ER May 25/40									
4	<u>SERGEANT</u>									
5	Clapp, Edwin J.	6648750	Aug 8/40	8					(14)	
6	Sol Medal. ER May 25/40. Honbly disch								2.76	1.75
7	Ft Leavenworth, Kans. Aug 7/40 per ETS.									
8	Reenl Aug 8/40 Wmnt as Sgt contd. Pay due									
9	fr date of reenlmt.									
10	<u>CORPORALS</u>									
11	O'Toole, Peter B.	6721140	Aug 2/38	0					(77)	
12	Aptd Corp fr Pvt 1st SO 160, Hq 3rd Bn,								2.52	
13	17th Inf. Aug 14/40									
14	Peterson, James	6657829	July 1/39	8					(98)	
15	ER May 25/40.								10.00	
16	<u>PRIVATE FIRST CLASS</u>									
17	Black, Clark T.	6643960	Feb 2/40	4	401				(98)	
18	Specl 401 fr Specl Sol 0 40		Aug 14/40.							
19	Davis, Clark C.	6643258	Apr 4/40	0	501					1.75
20	Specl Sol 0 41 Aug 22/40. Due US lost									
21	or damaged property MR 344.									
22	James, John	6641293	Dec 12/39	0						1.75
23	Williams, Edgar	6661249	Jan 18/39	4						1.75
24	Misr Specl 401 o 39 Aug 11/40.									
25	<u>PRIVATE</u>									
26	Abernathy, Albert O.	6671489	Oct 6/39	0						
27	Absent conft Ft McPherson, Ga, since									
28	Aug 13/40.									
29	Baker, John	6789456	Aug 5/40	0						
30	Enl Aug 5/40, Ft. Leavenworth, Kans.									
31										
32										
33										
34										
35										
36										
37										
38										
39										
40										
41										
42										
43										
44										
45										
46										
47										
48										
49										
50										
51										
52										
53										
54										
55										
56										
57										
58										
59										
60										
61										
62										
63										
64										
65										
66										
67										
68										
69										
70										
71										
72										
73										
74										
75										
76										
77										
78										
79										
80										
81										
82										
83										
84										
85										
86										
87										
88										
89										
90										
91										
92										
93										
94										
95										
96										
97										
98										
99										
100										
101										
102										
103										
104										
105										
106										
107										
108										
109										
110										
111										
112										
113										
114										
115										
116										
117										
118										
119										
120										
121										
122										
123										
124										
125										
126										
127										
128										
129										
130										
131										
132										
133										
134										
135										
136										
137										
138										
139										
140										
141										
142										
143										
144										
145										
146										
147										
148										
149										
150										
151										
152										
153										
154										
155										
156										
157										
158										
159										
160										
161										
162										
163										
164										
165										
166										
167										
168										
169										
170										
171										
172										
173										
174										
175										
176										
177										
178										
179										
180										
181										
182										
183										
184										
185										
186										
187										
188										
189										
190										
191										
192										
193										
194										
195										
196										
197										
198										
199										
200										
201										
202										
203										
204										
205										
206										
207										
208										
209										
210										
211										
212										
213										
214										
215										
216										
217										
218										
219										
220										
221										
222										
223										
224										
225										
226										
227										
228										
229										
230										

ing and auditing of deductions and payment of Class E allotments, a system of code numbers has been established. The proper code symbol must be shown on each Authorization for Allotment of Pay submitted; it must likewise be shown on each pay roll or voucher for every allotment entered on that roll. Deductions for allotments are entered on pay rolls or vouchers as soon as the soldier completes the required forms; it is not necessary to await notification of receipt by the Finance Officer, U. S. Army. When an allotment is discontinued in advance of its full term the deduction must be made until notification is received from the Finance Officer, U. S. Army, acknowledging receipt of notification of discontinuance.

Preparation of Pay Rolls. *Permanent record.* Soldiers are paid on pay rolls (W. D. Form No. 336) which are prepared and certified in triplicate by the organization commander. In view of the fact that these pay rolls are filed in the General Accounting Office as permanent records and may be subsequently used in connection with settlement of claims or questions affecting the pay of the men concerned, organization commanders should exercise great care that they are correctly made out.

Entries. A pay roll consists of one copy of W.D. Form No. 336 and as many forms No. 336a (inside sheets) as may be necessary. Names of all enlisted men in the organization will be entered on the pay roll from the date of receipt of notice of their assignment, whether or not they have joined. The names of enlisted men should be entered in the column "names, present and absent, grade and serial number" in the order of their grades and alphabetically within each grade. The soldier's name and serial number, date of enlistment, number of years service, and specialist rating, if any, should be written on the same horizontal line under proper column heading. Necessary remarks should be entered below the soldier's name, the first line only commencing one inch from the left edge of the page, and such remarks may continue through but not beyond the "Date of enlistment" column. As many lines as necessary may be used. These remarks should contain all data which may affect the soldier's pay and will be entered as provided for in "Model Remarks," Section II, AR 345-155. The use of figures for months, ditto marks, and the word ditto are prohibited. In all cases, in making entries the last name will be written first, e.g., "Doe, John H." and not "John H. Doe." (See Plate 19.)

Signing. When the pay roll has been made up, all men will be required to sign it. Signatures should correspond exactly with the names in the column "Names, present and absent, and grade," except that in signatures, last names will be written last, e.g., "John H. Doe." The original pay roll only is signed by the men of the organization.

Forwarding. When the pay rolls have been signed by the men and rechecked by the organization commander, the original and the first carbon copy are forwarded to the disbursing officer not later than the 25th day of the month. The second carbon copy is filed with the permanent records of the organization.

Payments. Payments are made to the enlisted men in cash at the pay table on pay day, which is usually on the first day of the month. This payment is made by the disbursing officer or, in many cases, by the company commander, who secures the money from the disbursing officer. At this time, all bills which are owed to the company by the enlisted men are collected. When the payment of the company is completed the organization commander signs the certificate on the pay rolls, acknowledging that he has witnessed the payment of all men paid and he then returns the pay rolls to the disbursing officer, together with the pay of any men who were not paid. Names of men not paid should be deleted by drawing a line through their names, marking each "not paid." These delineations must be initialed by the disbursing officer.

Military Correspondence. *General.* In military correspondence the same grammatical rules apply as those used in civilian communications. To write a letter clearly is not sufficient; it is essential that military correspondence be so worded as to obviate any possibility of its being misunderstood. Written correspondence should be limited and personal or local telephone conferences should be the rule. When letters are received they should, when practicable, be answered within twenty-four hours. Official correspondence with officers or individuals not in or under the War or Navy Department will conform to good civilian practice.

Channels of communication. The general rule is that, except as otherwise prescribed by the Secretary of War, communications, whether from a subordinate to a superior, or vice versa, will pass through intermediate commanders. This is known in the service as "going through channels." Thus a letter from Lieutenant Jones of Company A, 392d Infantry, to his regimental commander, requesting a leave of absence, would first go to the commanding officer of Company A, 392d Infantry, then to the battalion commander, and finally to the regimental commander.

Form necessary. In the preparation of a military letter there are certain general principles which must be followed. The letter should adhere to the prescribed form; it should be addressed to the commanding officer concerned and not to an individual; it should deal only with one subject; black ink only should be used; all letters should be written on one side only of letter-size paper (8 x 10½ inches). Unused margins should conform to the following width:

Top margin, first page	1 inch
Top margin, second and succeeding pages	1-¼ inches
Left margin	1 inch
Right margin	¾ inch
Bottom margin	1 inch

Pages (if more than one) are numbered consecutively in a single series, midway in the lower margin and one-half inch from the bottom of the sheet.

Prescribed form. (1) *Heading.* Nothing will be written in the upper third of the first sheet of each letter except the heading, which consists of the following:

The designation of the headquarters

The designation of the office

The reference file number

The post office address

The date

The subject

To whom the letter is sent.

(2) *Body.* The body begins just below the upper third of the first sheet. In military correspondence salutations common in civilian communications are not used, as for example: "Dear Sir," "Very truly yours," "Respectfully," and similar salutations. When typewritten, the body of the letter is single spaced, with a double space between numbered paragraphs. If a letter has more than one paragraph each paragraph is numbered serially with arabic numerals.

(3) *Signature.* Following the body of the letter comes the ending which consists of the signature, and immediately below the signature appears the officer's name typed identically with the signature, followed by the rank and organization or branch. If the officer signing the letter is in command, the word "commanding" will appear after the rank and organization.

(4) *Indorsements.* In the military service when it is necessary to answer a letter, a new letter is not written, as in civilian correspondence, but the reply is placed on the original communication in the form of an "indorsement," thus making complete, in one letter, everything which has been written in regard to the contents of the basic communication. The width of the indorsement will be the same as that of the letter and will begin one-half inch below the lowest element of the next preceding matter on the same page.

(5) *Inlosures.* In the event that other communications or documents are inclosed with a letter, a notation to that effect is placed just below the body of the letter or indorsement and marked *Incl. 1*.

Example. An example of a military communication:

Company A 392d Infantry

Fort Benning, Georgia
May 15, 1939.

Subject: Leave of absence.

To: Commanding Officer, 392d Infantry

(Through Commanding Officer, 1st Battalion 392d Infantry)

1. Request that I be granted a leave of absence for ten days effective May 20, 1939.
2. My reason for this request is that I desire to attend to some business matters.
3. My address while on leave will be care of St. George Hotel, Chicago, Ill.

(Signed) Charles D. Green,
CHARLES D. GREEN,
Captain, 392d Infantry.

1st Ind.

201-Green, Charles D., Off.

CTG-HB

Hq. 1st Bn 392d Inf., Fort Benning, Ga., May 16, 1939.—To Commanding Officer, 392d Infantry.

Approved.

(Signed) Charles T. Stone,
CHARLES T. STONE,
Lt. Col., 392d Infantry,
Commanding.

Correspondence Book and Document File. *Correspondence Book.* Military correspondence is recorded by an organization commander by using a correspondence book (W. D., A.G.O. Form No. 8) supplemented by a document file. The correspondence book, which is a part of the permanent file of an organization, consists of numbered pages, referred to as the "body," and an alphabetical index, referred to as the "index." Entries made in either the body or the index are made in ink or indelible pencil.

Entries. Entries are made in the body of the book of each communication respecting which a record in the company is necessary and for which no other method of recording or filing is prescribed. This entry consists of the subject, the name of writer, the place and date, the date of forwarding or receipt, the disposition of the original and the serial number. Serial numbers begin with No. 1 and subsequent entries are numbered in sequence. When there is represented in the document file copies of a document and notation of action taken on it, it is necessary only to enter, in the correspondence book, the serial number of the document and the abbreviation "Doc." However, when there is no document or copies thereof present in the correspondence file, entries in the body of the correspondence book should include the serial number and a brief statement of its contents.

Index. Each document recorded in the body of the correspondence book should be indexed alphabetically under its subject and when necessary, cross-indexed under the names of the writer and under the name of the person or office to which addressed. The index entries for a specific document should bear the same serial number as that given to the document.

Document file. The document file supplements the correspondence book and contains the original documents or communications when they are retained, and a legible copy of all letters, indorsements or telegrams originating in the office. Each item in the file is numbered serially, beginning with No. 1 and bears the same number as the item and index entries in the correspondence book. Documents are filed according to serial numbers and kept together in the field desk.

Inspections. In order to prevent the accumulation of unnecessary or obsolete "documents" in the document file, an inspection is made annually by the commanding officer of the post or station, or an officer designated by him, and all papers which have become obsolete or unnecessary are eliminated.

Recording eliminations. When documents are eliminated from the document file, the

abbreviation "Doc" on the body of the correspondence book is lined out and the date of elimination and the initials of the inspecting officer are inserted.

Free Postage. Penalty Envelope. In conducting official military correspondence it is not necessary to pay postage provided "penalty" envelopes or wrappers are used. A "penalty" envelope derives its name from the fact that there is printed in the upper right-hand corner the words "Penalty for Private Use, \$300."

Use of penalty envelopes. The regulations provide that official communications and other mailable matter relating exclusively to the business of the United States, mailed by an officer of the army, will be transmitted free of postage in the domestic mails of the United States when inclosed in a "penalty" envelope or wrapper, and likewise to transmission free of postage in the mails, between places in any possessions of the United States, from one to another of such possessions, from the United States to such possessions, and from such possessions to the United States; also from the United States to Canada, Cuba, Mexico, Newfoundland, and the Republic of Panama. If an officer has no penalty envelope available he may write in the upper left-hand corner of the envelope "Official Business" over the name of the department, bureau, or office including the name of the officer sending it, and in the upper right hand corner the words "Penalty for Private Use, \$300."

Use of penalty envelope for replies. When writing relative to official business to a person not in the military service, a properly addressed penalty envelope may be inclosed to cover the reply, when reply appears necessary, but penalty envelopes will not be furnished to merchants or other dealers to cover the transmission of public property or the return of official vouchers, nor to a contractor or bidder to be used to send in the mails, free of postage, proposals or other matter concerning the business of the contractor or bidder with the government.

Packages. Packages of official matter including articles of public property, which are not greater in size than 84 inches in length and girth combined, may be sent through the mails subject to certain restrictions.

Air mail, special delivery, and registration. The prescribed air mail postage must be paid on all official mail intended for dispatch by airplane service.

Official mail which is of such character as to require the more expeditious delivery thus afforded will be sent "Special Delivery"; however, postage stamps to cover special delivery must be affixed, as is required for nonofficial mail.

When it is desired to register an official communication, stamps must be added covering the registration.

Stamps for special delivery and registration are secured from the quartermaster.

Company Orders. Preparation. Company orders are issued by the company commander and contain information which is deemed of sufficient importance to be published in formal written form to the entire personnel of the company. They are means by which a company commander records administrative matters and promulgates them to his organization. Such orders are also the means of announcing appointments, promotions and reductions made by the authority of the company commander. It is customary to number orders of this type serially within each calendar year.

Form. The usual form for a company order is shown on the following page.

Company A, 392d Infantry
Fort Benning, Ga.,
December 16, 1940

Order
No. 8

1. The following appointment is announced in this organization: *To be appointed private first class* Private Henry C. Benning, No. 687549.

2. The following reduction is announced in this organization: *To be reduced to the grade of private*: Private first class Henry R. Burke, No. 699845.

(Signed) Harry H. Wilson,
HARRY H. WILSON,
Captain, 392d Infantry,
Commanding.

Copies to:

- 1 File
- 1 Personnel
- 1 Bulletin Board.

History of Service. *Preparation.* Army Regulations now require that each company commander maintain a history of services of his organization; this may be kept in any suitable book or other permanent form. This record is a brief chronological history of the company from its inception and contains information concerning the original organization of the unit, notations as to the sources from which the personnel was obtained. In the case of a newly organized reserve regiment a majority of the personnel would come from civil life. There also should be noted a record of the strength of the organization at all times, its different stations, its marches, campaigns, battles, and its losses in battle, its various commanding officers, together with members of the company who have distinguished themselves in action.

Use. It is the paramount duty of each company commander to weld his company into a body capable of being commanded and accustomed to his leadership. He should instill into his men loyalty, sentiment, enthusiasm without limit, esprit de corps. It will assist the company commander in accomplishing this mission if he uses the history of services as a basis for short talks, reminding the command of the history of their organization and the important engagements in which the unit has participated.

Diary. *Army Regulations* require that troops engaged in actual or threatened hostilities, or engaged in maneuvers, maintain a diary. Such a record is kept by all combat units from the company up to the higher organizations. In the diary is entered a detailed contemporaneous account of just what the company does each day, usually entered hour by hour as the events occur. There are also entered other items of military interest, such as positions reached, prisoners captured, and the morale of the troops. In preparing a diary, three copies are made, two being forwarded to the next higher commander, and one retained for the company file.

Use of Army Regulations. *Index.* In order to facilitate the finding of a desired regulation on any subject, the War Department has issued two army regulations: AR No. 1-5 consists of an alphabetical index, and AR No. 1-10 consists of a list of current army regulations by title arranged numerically according to the serial classification which has been adopted.

Orderly Room file. In view of the fact that it will be necessary to consult *Army Regulations*, it is important that each organization commander maintain, in the Orderly Room, a complete file of the latest appropriate regulations. These regulations should be filed in a binder in numerical sequence, as determined by both the base and subnumbers. *Army Regulations* are altered from time to time by the issue of new regulations and by what are known as "changes." Changes should be filed and kept with, and immediately preceding, the pamphlets to which they respectively pertain. It is good practice to mark, in red ink, that part of the regulation which has been changed, thus calling attention to the existence of the "change" next preceding. When new regulations are received they supersede all existing regulations of similar character on the subject, including any changes which may have been issued.

MESS MANAGEMENT

Introduction. The subject of mess management is of particular importance to the medical officer. In the operation of a hospital the choice of diets and the skillful preparation of foods will be a matter of his daily concern in the treatment of patients. Officers assigned to duty with units of a medical regiment will operate messes for the feeding of their own men. The usual station hospital operates a mess for its assigned personnel as well as diet kitchens for patients. Financial and stock records must be accurately kept. Mess personnel must be trained, organized, and supervised. It is a great truth that there is no single factor which is more important in the stimulation of morale than the serving at proper intervals of an adequate quantity of well-cooked food. Good food is the sum of good ingredients, good cooks, and good tools with which to work in its preparation. The officer who is assigned to duty which involves responsibility for a mess must be well instructed or his supervision will be of doubtful value.

Definition. Mess management is the supervision and control exercised over every phase of the operation of an army mess. The term *mess* is applied to those army groups who, for convenience, sociability, or economy, eat together. As used herein the term *mess* applies to company and detachment messes. Mess supervision is a function of command and is exercised in some degree, by all commanders over the messes within their respective organizations. Direct control is exercised by the mess officer, who is assisted by the mess sergeant, cooks, and other mess personnel. Within the company the mess officer may be either the commander himself or a company officer designated by him. The phases of operation involved are the preparation of menus; the procurement and storage of food; the preparation, cooking, and serving of food; the proper use of the mess equipment; the economical and efficient use of rations; sanitation; and mess accounting.

Object. The object of good mess management is to build and maintain an efficient, economical, and attractive mess. Nothing contributes more to the morale of an organization than the fulfillment of this mission. It is not necessary for a mess officer to be an expert in cooking and nutrition to accomplish this task. He needs only to apply fundamental principles and check the operation daily to see that a variety of good food, balanced and properly cooked, is sanitarily served, without waste, in an attractive manner.

Organization of the Mess. The company commander is solely responsible for the mess. It is his duty to make certain that the mess is operated efficiently and economically, and that ample food of high quality is provided for the members of his company as regular procedure. In view of his many other responsibilities, he should appoint one of the lieutenants of the company as mess officer, thus giving the details of mess operation a closer supervision than would otherwise be possible.

The *mess officer* has entire charge of the mess. He should inspect, in company with the mess sergeant, the kitchen, the mess hall, the storeroom, and the personnel daily. He should check the menus to make certain that a balanced diet will be prepared. He should check the bookkeeping and inventory records frequently and thoroughly so that an accurate financial statement of the mess can be produced at any time. He should observe the preparation of the food to make certain that it is being well cooked. He should be present each day during the serving of at least one meal.

The *mess sergeant* is one of the most important men in the company; he is one of the key men in the organization. He is in direct charge of everything that goes on in the mess. He has charge of the purchasing and the drawing of rations. He keeps all the accounts; supervises the preparation and serving of the food; is responsible for all the kitchen equipment and its sanitation, and for the cleanliness of all the personnel and the equipment and is in charge of the training of the cooks.

The *cooks*, under the supervision of the mess sergeant, prepare and serve the food. They supervise and direct the work of the kitchen police. In the absence of the mess sergeant, the cook on duty is in charge of the kitchen. In every mess there should be several student cooks undergoing training.

The *dining room orderly* is in charge of the mess hall and pantry and is responsible for their cleanliness. He is charged with the cutting and the serving of the bread. He also sees that any breakage of dishes is reported so that the person responsible may be charged therefor.

There are detailed each day as many *kitchen police* as are necessary for the operation of the mess. The kitchen police may be lowly in rank but their work must be recognized as of great importance. They assist the cooks and dining room orderly in serving the meals, preparing the food, and cleaning the kitchen, utensils, equipment and dishes.

Food Functions. Food is the general term for what is eaten by man in order to sustain life. When all the foods required to furnish energy, build and repair the body, and keep the body in a state of health are provided in a correct proportion, the diet is said to be balanced. A *Balanced Diet Chart* is shown below:

BALANCED DIET CHART

Food function	Class of foods	Foods used:
Furnish energy.....	Carbohydrates {	Sugars { Sirups Molasses
		Starches { Flour Breadstuffs Potatoes and other starchy vegetables Cereals
	Fats.....	Butter, lard, meatfats, oils
Build and repair the body...	Proteins.....	Lean meats Cereals Eggs Fish Milk and cheese Beans, peas
	Minerals.....	Leafy vegetables Fruits Whole grain cereals Milk
Protect health.....	Vitamins.....	Fresh milk and cheese Fresh fruits and vegetables, especially raw Canned tomatoes Butter Eggs Whole grain cereals Fresh meats, especially liver
	Bulk.....	Leafy vegetables Fruits Whole grain cereals

The body performs its functions best when the prepared foods are consumed in definite ratio to each other, the total amount of each varying according to the type of work being performed. Computation is quite involved for the determination of the exact quantities

of each kind of food required for different types of work. Insofar as the army is concerned in time of war or mobilization, this problem has been solved by the adoption of the field ration, which provides a reasonably well balanced diet, assuming that it is properly issued, handled, and used. The prescribed ration components may be departed from in time of peace.

A reasonably well balanced diet may be obtained by serving meals during a day or over a period of days which:

- (1) Include foods from each class—carbohydrates, proteins, vitamins, fats, minerals, and bulk.
- (2) Have variety—different meats, different vegetables, salads, and desserts.
- (3) Include vitamins and bulk foods—especially vegetables, fruits, and milk. These should be served daily if possible.

RATIONS

Definition. A ration is the allowance of food provided by the government for soldiers, and other authorized personnel during active service, for the subsistence of one person for one day. Officers are not entitled to rations but may draw them when in the field. They must deduct the value thereof from their pay vouchers.

Kinds of Rations. There are several different kinds of rations, each made up for certain conditions of service. The more common ones are:

The garrison ration.

The field ration.

The travel ration.

The Filipino ration.

Garrison Ration. The garrison ration is that prescribed in time of peace for all persons entitled to a ration, except under specific conditions for which other rations are prescribed, and consists of the following:

Meat: Bacon; fresh beef; fresh pork; fresh chicken.

Eggs.

Dry vegetables and cereals: Beans; rice; rolled oats.

Fresh vegetables: Beans, string and canned; canned corn; onions; canned peas; potatoes; canned tomatoes.

Fruit: Canned apples; jam or preserves; canned peaches; canned pineapple; prunes.

Beverages: Coffee, roasted or roasted and ground; cocoa; tea.

Milk, evaporated and fresh.

Lard; or lard substitute.

Butter; wheat flour; baking powder; macaroni; cheese; sugar; cinnamon; flavoring extract; black pepper; cucumber pickles; salt; syrup; vinegar.

The garrison ration is always issued in the form of a cash allowance. Each month the total value of the rations due an organization for that period is placed to its credit with the Quartermaster. The company, or detachment, purchases selected articles of the ration in the amounts desired and obtains a settlement of its account at the end of the month. Any savings accrued are paid in cash. This is called rations savings and only may be used to pay for food items. This procedure is known as the *ration savings privilege*. It permits the serving of a wide variety of food.

Field Ration. The following rations are prescribed for field service (Circular 88, W. D., November 7, 1939.)

Field Ration A: Corresponds to garrison ration (perishable.)

Field Ration B: Same as A, but with nonperishable components.

Field Ration C: Previously cooked balanced ration; 6 cans per individual ration, 3 of meat and vegetables, and 3 of crackers, sugar, and coffee.

Field Ration D: Three 4-ounce chocolate bars per individual ration.

The A ration will normally be issued daily from army Class I railheads to all divisions and other units not actively engaged with the enemy. In battle, one of the nonperishable rations or combinations thereof will usually be issued daily to the units engaged.

Travel Ration. The travel ration is issued to troops, either in time of peace or war, who, while traveling, are separated from cooking facilities. It is usually issued in kind but

the value of the coffee, milk, and sugar components may be issued as "liquid-coffee money" when it appears probable that hot water and utensils for making the beverage can not be obtained enroute.

THE PROCUREMENT AND STORAGE OF FOODS—MENUS

The Procurement of Food and Preparation of Menus. The procurement of food and preparation of menus are interdependent. Each operation requires advance planning and a careful consideration of the other in order to effect economy, variety, and satisfaction in mess operation.

In peace time a careful study should be made of the commissary price list and of local market conditions. Fresh milk, fruits, vegetables, fish, and similar articles are usually procurable, at attractive prices, to supplement or replace components of the garrison ration. Menus should be prepared at least a week in advance and arrangements made for delivery of perishable stores on the day required when possible. The purchase of excessively large stocks of food should be avoided, especially the purchase of large quantities of those foods which spoil readily. With a knowledge of what foods are available, menus can be prepared well in advance to provide for variety and a balanced diet. Numerous sample menus for various periods have been prepared and are readily available to the beginner as aids and guides. In general, the various meals should include the following when possible:

(1) Breakfast—fresh fruit, a cereal, meat or a meat substitute, a vegetable, bread in two forms, butter and coffee.

(2) Dinner—soups; meat, poultry, or fish; at least two vegetables, one leafy and one root; a salad; bread; dessert; and a beverage.

(3) Supper—a little meat, a vegetable, plenty of bread and butter, a bit of sweet, and tea.

When the field ration is issued the company mess officers do not know in advance exactly what articles of food will be included in the daily issue of rations. The supply agencies in rear vary the selection of components to insure variety and a balanced diet. The company kitchen personnel should exercise ingenuity in effecting food combinations with what they get, by automatic supply.

A phase of procurement, except in combat, is the inspection of food on delivery to the mess. The mess sergeant, or a delegated representative, should receive, inspect, and properly store all food items received by the mess. Such items should be clean, sanitary, wholesome, in full weight and measure, and of the grade required. Food which is decomposed or rotten, insect infected, wormy, moldy, or musty does not have to be accepted and should be rejected. It is especially important to inspect for condition all highly perishable meats, fish, poultry, fresh milk, fresh fruits and vegetables, butter, eggs, and the like. Cereals should be free of insects and canned goods should include no swollen or leaky cans. The weight of wrappings and containers should be deducted. The government contracts for net weights.

Storage of Foods. The proper storage of food products is important in the interests of economy and sanitation.

All foods spoil more rapidly in warm temperatures than in cold. This especially applies to highly perishable foods such as meats, fish, butter, eggs, milk. Spoilage of most foods is hastened by dampness. In general, foods keep best when dry and cold. The refrigerator, when available, should not be used as a storeroom. The purpose of refrigeration in the mess is to prevent spoilage for a short period of time and to chill certain foods to increase their palatability. Hot food containers should be chilled before being placed in the refrigerator. All containers should be wiped off before being placed in the refrigerator. Flat, shallow containers are preferable, to tall, unstable ones. Foods absorbing odors should be covered and kept away from those which give off odors. The arrangement within the refrigerator should permit free circulation of air around the stored food. Food should not be placed in the ice compartment. The refrigerator should be maintained with tightly fitted doors, and be kept well drained, clean and dry.

The food storeroom must be kept clean and sanitary and the stores therein inspected frequently for spoilage. Stored goods should be neatly arranged and readily accessible. It

is well to keep goods up off the floor to avoid mold or rot. Dark corners and crannies should be examined frequently for roaches, ants, and vermin. These are attracted by dirt, crumbs, and scattered food scraps. Only food products should be kept in the food storage room; avoid the storage there of kerosene, oily rags and paints and varnish. Coffee should be kept in tightly closed containers to retain its strength. Spoiled foods should be removed promptly from the storeroom and set apart from all other foods.

COOKING

General. Proper cooking renders food more palatable and digestible and destroys any disease germs or parasites which might be present in the food. The most important factors involved are proper cooking time and temperature and good seasoning and blending.

Meats. Meat is the most expensive component of the ration.

Beef is the most important food used in the Army mess. It is universally popular and forms the main dish of many meals.

(1) The tender cuts of a beef carcass are:

(a) The rib in the forequarter and

(b) The loin in the hind quarter.

These are best cooked as steak, or oven-roasted by moderate dry heat in an uncovered roasting pan. A common error in cooking these cuts is long cooking at high temperatures so that the meat becomes dry, hard, and unpalatable when served.

(2) The less tender cuts of beef are:

(a) chuck, neck, brisket, plate, and shank in the forequarters and

(b) round, flank, and shank in the hind quarter.

These cuts are best cooked by a long slow roast at moderate temperature in moist heat, or by being made into stew, meat loaf, or hamburger.

Pork is usually tender but it must be thoroughly cooked to kill any trichinae that may be present. Ingestion of trichinae may result in serious illness or death. A temperature of 137° F. throughout the pork will kill all trichinae. A simple test is to see that the cooked pork is an even gray color throughout, with no pink showing.

Veal is usually best cooked by long, slow cooking in moist heat. In cooking lamb and mutton, the same principles apply as for beef. This is also true of poultry; young poultry is tender, old poultry is less tender.

Vegetables. The principal methods of cooking vegetables are boiling, steaming, baking, and frying. Boiling is the most common. As a general rule, all vegetables should be cooked only enough to make them tender. This applies especially to the green leafy vegetables, as cabbage, cauliflower and spinach. Overcooking is the common error in boiling and results in loss of color, flavor, vitamins, and food value. Canned vegetables have been sufficiently cooked during the canning process; all they require is a little heat and seasoning to make them palatable. Dry beans require long soaking and then cooking for a long time at a temperature below the boiling point. Dehydrated vegetables require an overnight soaking and about four hours' cooking below the boiling point.

Salads. Salads are easily prepared. The fundamental principles to be observed are that the salads must be served cold, should be well seasoned and attractively served. Salad combinations are unlimited; for example, various combinations of fruits, nuts, vegetables, poultry, meats, fish and eggs, may be used in different ways.

Pastry. Pie, cake, cookies, and rolls require a *higher heat* than do meats and vegetables and a *shorter cooking time* than meats. Care must be exercised not to scorch the outside before the inside is cooked.

Beverages. Coffee is the most commonly used of the prepared beverages. A few simple rules for its proper preparation are:

Use ground coffee only once.

Use fresh boiling water.

Prepare the coffee no earlier than fifteen minutes before serving.

Make only enough for one meal.

Keep the coffee pot scoured.

Field Cooking. The principles of cooking are the same for field as applied in garrison. The chief difference is in the equipment used. In infantry units it is usually the

field range. The field menus are necessarily more simple than those afforded in garrison but they need not be monotonous. By proper use of the field range, meats and vegetables can be prepared in a large number of ways, and the flour issued in the field ration can be baked in many different forms. The lack of suitable equipment or ingredients should never be accepted as an excuse for not turning out a wide variety of palatable dishes.

Preparation of Foods for Cooking. Scrupulous cleanliness is the first consideration in the preparation of foods. The clothing and person of the cook, the utensils, and the food itself should be in as clean condition as possible. Polluted foods or unsanitary conditions in the kitchen may easily become the source of much sickness. The food should be inspected and sorted and all decayed or unfit portions eliminated, then followed by necessary cleaning, trimming, cutting, soaking, or other operation preliminary to the actual cooking.

Serving Food. The proper serving of food is an important element of good mess management.

It is of little use to exercise great care in selecting and cooking food if it is to be presented for consumption in an unattractive manner. A little forethought and ingenuity will lend appetizing appeal to the plainest foods and pay large dividends in morale. Food should be prepared at the proper time; foods intended to be served hot should be actually hot and those intended to be cold should be cold; neither should be placed on the table too early. Serving dishes for hot foods should be kept warm. Cold foods should be amply chilled in advance. Roast meat should be sliced uniformly and the slices laid evenly and neatly on the platter. If gravy is spilled on the edges of the platter, or any serving dish, it should be wiped away. Soft foods such as mush, mashed potatoes, and turnips, should be neatly rounded off, not merely thrown into the dish. Pies and cakes should be neatly arranged on the serving dish without excess loose crumbs. Fresh fruits such as apples, oranges, pears, grapes and bananas, are much more palatable when served chilled. It is economical to halve oranges, apples, and pears before serving. This practice encourages consumption by adding appeal and prevents the carrying away of fruit uneaten. Large bunches of grapes should be cut into smaller ones. A little cracked ice added to butter, olives, radishes, green onions, celery, lettuce and sliced tomatoes, before they are sent to the tables makes these foods much more appetizing. One of the best ways to make food attractive is by garnishing. The effect of color contrast is very pleasing. Small quantities of many materials can be used for garnishing at nominal costs. Some of these are parsley, paprika, strips of pimento, green pepper, and bacon; slices of lemon, tomato, and hard boiled egg; a few French fried potatoes; small quantities of green lima beans, diced celery, small whole boiled onions, green peas, and cooked carrots; coconut, etc.

The mess halls should be clean and inviting. Good light and ventilation, painted walls and clean windows hung with curtains, are all morale builders. Clean mess tables with an ample assortment of condiments and an orderly arrangement of thoroughly cleaned dishes and tableware are conducive to good appetites. Condiment containers should be kept well filled and clean. When table linen and chair covers are used they should be replaced and laundered frequently.

In the field food should be served systematically in order to expedite service while the food is hot, to avoid wastage, and to retain morale. Arrange the food containers in a broken line to allow two rows of men to pass simultaneously, one on either side of the server. Serving is facilitated by raising the containers off the ground to a convenient level. In general, foods should be served in the meat can, cover, and cup, in the following order: meat, vegetables, salads, dessert, bread, butter or jam, and beverage. Food servers must be trained to estimate accurately the number of portions of a given size which may be served from the different sized kitchen containers. These food servers should avoid spilling food, filling mess kits overfull, and unnecessarily mixing food together in the mess kits. Portions issued for the first helping should be of moderate size. No man should be given a second helping until all have had a first helping. The serving line should be so laid that the men will naturally head away from the kitchen after being served, preferably in the direction of the water-sterilizing bag or fresh water supply. A definite area should be assigned in which the food served is to be eaten in order to avoid food being taken into tents or unduly scattered. Either garbage cans, an incinerator, or a pit must be provided for disposal

of scraps of food. Three cans of boiling water, two soapy for washing and one clean for scaldings and rinsing, should be provided. These cans should be readily accessible and, if possible, should be aligned over a fire to insure continuous high temperature of the water. When in close contact with the enemy the foregoing procedure must be modified to effect secrecy and security. The use of lights must be restricted and bunching must be avoided.

SANITATION—MESS EQUIPMENT

Sanitation. Every precaution must be taken to preserve a high standard of sanitation in mess operations. All mess personnel should be constantly alert to prevent the transmission of disease through the contamination of food served to troops.

All food handlers must receive a prescribed examination by a medical officer, prior to assignment to duty as such, and periodically thereafter while remaining on such duty. The personal cleanliness of mess personnel must be rigidly enforced. Points to be noted are: frequent washing of hands, always after visiting the latrine; daily shaves, baths, and changes of underwear (oftener in warm weather); short finger nails, free from dirt; and frequently trimmed hair. White caps for cooks are not ornaments; they prevent hair and dandruff from falling into foods and should be worn constantly by them when on duty. Personnel with ailments such as coughs and colds, or with infections on their hands and arms, should not be permitted to handle foods while so afflicted.

The mess area must be kept thoroughly policed and protected against pests. Mess premises and activities should be screened. Flies, rats, mice, cockroaches, and insect pests must not be tolerated. A continuous campaign of extermination must be waged against them. Refuse, scraps, soiled containers, and empty milk bottles must not be left exposed to attract pests. Garbage racks and cans must be thoroughly protected and frequently cleaned. The kitchen, mess hall, storeroom, and all utensils and equipment must be kept scrupulously clean. The preservation of a clean environment is conducive to better workmanship and personal cleanliness as well as being a protection for the health of the command.

Mess Equipment. The kitchen and mess hall must be supplied with a sufficient quantity of suitable equipment. Such equipment must be properly cared for and kept in good repair. Coal ranges should be fired frequently with small amounts of coal to obtain even heat. Ashes must be removed frequently. No range should be subjected to excessive heat. This warps the range, burns out the oven, and scorches the food. Ranges should be cleaned frequently and thoroughly. Sinks must not be permitted to sour or become greasy. Ice boxes must be kept clean throughout and dry. Cooking utensils must be washed promptly in warm, soapy water, then scalded and air dried. Initial washing in scalding water cooks the food on the utensil and renders its removal difficult. Utensils should be placed in orderly arrangement, readily accessible to the kitchen table. Such a table should be large and sturdy, designed and placed for convenience in food preparation.

Either the field range or the rolling kitchen constitutes the cooking equipment for infantry units in the field. Both are complete and compact. Since immediate replacement may be difficult, especial care must be exercised to prevent the loss of or damage to this essential equipment. Excessive heating of either must be avoided to prevent warping. When heavy loads are placed on the field range boiling-plate, or attachments, angle irons should be laid across the top so that weight will rest on the side walls to prevent breaking. When installing the field range, the oven must not be banked with earth; to do so will cause the sheet iron along the sides to warp and finally burn through.

MESS ACCOUNTING

Records. Good mess management requires that a careful, continuous record be maintained of all mess transactions.

In garrison, the organization commander submits a requisition on the quartermaster for rations on the first day of each calendar month for the preceding month, or at such other times and for such other periods as may be necessary. Such a requisition is called a *ration return*. It is the basis for credit established with the quartermaster. The data for the ration return is obtained from the morning report. In the field rations are issued

in kind. The accounting system explained herein is not applicable to rations which are issued in kind.

The amounts and costs of the ingredients used in the preparation of each day's menu are set forth on the reverse side of W. D., Q. M. C. Form 340 (see Plate 2); the amounts used are totaled across the bottom, and the costs involved are noted along the right side of this form. The entries on the upper portion of the face of this form show the status of the stock for that day, including notations of receipts and expenditures. The receipts must correspond with sales tickets and delivery slips for goods received. The expenditures are

WAR DEPARTMENT
Q. M. C. Form 340 (Old No. 440)
Approved March 7, 1927

DAILY STOCK RECORD

RATION ARTICLES						SALES ARTICLES—Continued							
	Unit	Bal. Fwd.	Rec'd	Total Acct.	Used	Bal. on Hand		Unit	Bal. Fwd.	Rec'd	Total Acct.	Used	Bal. on Hand
Apples, unpack. boxes, fks.	Crt.	1		1		1	Cherries	Cans					
Baking powder	Cans	5		5	4 1/2	4 1/2	Chocolate, plain	Pkgs					
Bacon, issue, cr. or cns.	Lbs	10		10		10	Cocoa, br	Cans	5		5		5
Beans, issue, R. kidney	Lbs	50		50		50	Coconut, shredded	Pkgs	2 1/2		2 1/2		2 1/2
Beef, fresh	Lbs	40		40	40		Corn, sweet	Cans					
Beef, corned, 1, 2, and 6 lb.	Cans						Corn flakes	Pkgs	100		100	100	
Bread, soft	Lbs	30	50	80	30	50	Crackers, ass't'd meal	Crts	10		10	1	9
Butter, issue, prints	Lbs	8	12	20	19	1	Cream of Wheat	Pkgs					
Butter, issue, tubs	Lbs						Currants	Pkgs					
Cinnamon, ground, 1/4 can.	Cans						Curry powder	Bots					
Cloves, ground, 1/4 can.	Cans						Tomato Tomato juice	Crts	6		6		6
Coffee, roasted and packed	Lbs	60		60	10	50	Fruit, pie, ass't'd.	Cans					
Corn meal, white or yellow	Lbs						Gelatin	Pkgs					
Fish, salmon	Cans						Grape fruit fruit	Pkgs	100		100	50	50
Flavoring extract, L, 2-oz.	Bots						Ham, sugar-cured	Lbs					
Flavoring extract, L, 8-oz.	Bots						Hominy, lye	Cans	2 1/2		2 1/2		2 1/2
Flavoring extract, V, 2-oz.	Bots						Honey, strained	Bots					
Flavoring extract, V, 8-oz.	Bots	1	4	5		5	Ham Oyster st	Bots	20		20	8	12
Flour, issue	Lbs	50	100	150	44	106	Jelly, ass't'd	Cans					
Ginger, ground, 1/4 can.	Cans						Macaroni, boxes	Lbs	25		25		25
Jam, ass't'd. #10	Cans	21		21		21	Molasses	Cans					
Lard, issue	Lbs	10		10	10		Mushrooms	Cans					
Lard substitute	Lbs						Mustard, ground	Cans					
Milk, evaporated	Cans	48		48	28	20	Mustard, prepared	Bots					
Meats, fresh	Lbs						Onats, rolled	Crts	24		24		24
Nutmeg, whole	Lbs						Oil, olive	Bots					
Oleomargarine	Lbs	50		50	6	44	Olives	Bots	6		6		6
Onions, fresh	Lbs						Peaches, #10	Cans	6		6	3	3
Peaches, evaporated	Lbs						Pine Papaley	Cans		5	5	1	4
Peanut butter Peanut butter	Lbs	200		200	45	155	Pens. #22	Cans	24		24		24
Potatoes, fresh	Lbs	100	200	300	25	265	Pens, split	Lbs					
Prunes, boxes	Lbs						Pepper, ass't'd	Bots	10		10	1	9
Pickles, cucumber, #10	Galls	2		2		2	Pepper, chili col	Bots					
Rice	Lbs	20		20	1	19	Pickles, ass't'd	Bots					
Salt, issue	Lbs	12		12	3	9	Pineapple, #10	Cans	6		6		6
Sirup, issue, #10	Cans	2		2		2	Preserves, ass't'd	Cans					
Sugar, granulated	Lbs	100		100	33	67	Brussels Cabbage	Cans		10	10	2	8
Ten, black or green	Lbs		5	5	2 1/2	2 1/2	Raisins	Pkgs	12		12	4	8
Tomatoes	Cans	10		10	10		Rice, Puffed	Pkgs					
Vinegar	Galls	2	2	7	5 1/2	6 1/2	Sausage Paprika	Bots	2		2	1	1
Yeast, compressed	Lbs	1		1	1		Sauerkraut	Cans	8		8		8
SALES ARTICLES							Sausage, pork or Vienna	Cans					
Allspice, 1/4 can.	Cans						Shredded Wheat	Pkgs					
Apple butter	Cans						Spaghetti	Crts					
Apples, No. 2 10 can.	Cans	5		5		5	Spinach	Cans	5		5	3	2
Apricots	Cans						Starch, corn	Pkgs					
Asparagus	Cans						Sugar, powdered	Lbs					
Bacon, breakfast, boxes	Lbs		30	30	27	3	Paprika Collards	Cans		12	12	12	
Barley	Lbs						OTHER ARTICLES						
Bay leaves	Pkgs						Eggs, fresh	Doz	20	30	50	18	32
Beans, stringless, #10	Cans	18		18		18	Milk, fresh 1/2 pints	Gals	12 1/2	12 1/2	12 1/2		
Beans, Lima, dry	Lbs	50		50	15	35	Tomato puree	Cans	2	4	6	6	
Beans, Lima	Cans	24		24		24	Mayonnaise	Gals	1		1	1 1/2	3 1/2
Beans Beans, Lima	Cans	6		6	2	4	Corn, beef hash	Cans	8		8		8
Butter, sales	Lbs						Hominy, grits	Lbs	10		10	9	1
Cheese Cheese, Calary	Bots		12	12	2	10	Ham	Lbs		42	42	12	2
Cheese swiss	Lbs	10		10	4 1/2	9 1/2	Tomatoes, fresh	Lbs	30		30	10	20
							Lettuce	Heads	27		27	15	9

DAILY MESS STATEMENT. RATION VALUE, \$ 5944
 Rations due to-day 99. Value, \$ 58.45 To date 1045 Value, \$ 621.15
 Collections from boarders to-day, \$ 1.40 To date, \$ 9.60
 Total value of rations and collections to date, \$ 630.75
 Cost to-day, \$ 57.04 To date, \$ 628.30
 Savings, shortages, to date, \$ 2.45
 Stock on hand at beginning of month, 9/11, 1938 Value, \$ 112.40
 Stores purchased to-day, \$ 49.68 To date, \$ 615.40
 Total stock remaining on hand and purchased to date, \$ 719.60
 Total cost of stores consumed to date, \$ 622.30
 Value of stock remaining on hand to date, \$ 1.24.20

Plate 1. Daily Stock Record.

The monthly mess account is kept on *W. D., Q. M. C. Form 469* (see Plate 3). The form is self explanatory. The entries on the upper portion of the face of the form record the daily and cumulative credits and expenditures throughout the month, and the financial standing of the mess with the quartermaster. The entries on the reverse side record the result of the ten day periodic inventory by the mess officer. Goods received during the previous ten days are checked and recorded in Column 4, which when added to the balances brought forward (Column 3) from the preceding ten-day period, gives the figures in

Organization Co. A, 55th Q.M. Regt. Date Aug 10-11, 1938

Prepared by King and Smith
Verified by A. J. Kupper, Mrs. J. H.

M. M. M.

WAR DEPARTMENT
Q. M. C. Form 409
Approved Dec. 7, 1923

MONTHLY MESS ACCOUNT OF School for Baxera and Braks MONTH October YEAR 1938

Value of Ration, \$ 3.389 Allowance from Company Fund for Month, \$ _____ for Day, \$ _____ Value of Stock at End of Previous Month, \$ 188.88

[illegible]

(5) dropped to compensate for fractions of cents in computing daily money allowance.

I certify that the above is correct.

October 31. 1938

Value of stock on hand at end of previous month, . . . 188.88

88.881

Decrease in value of stock,	20,41
---------------------------------------	-------

17.02

Standing of mess on last day of month, \$ 28.27

28.27

Gain ~~loss~~ in mass for month 7.86

98.7

Audited:

October 31 1938

88

May: Officer in charge of Mass.

Plate 3. Monthly Mess Account.

STOCK RECORD

1	2	10th Day						20th Day						Last Day					
		3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
ARTICLES	UNIT	BAL. FORW.	REC'D	TOTAL ACT (10-10)	USED	BAL. ON HAND (10-10)	VALUE OF 10-10	BAL. FORW.	REC'D	TOTAL ACT (20-20)	USED	BAL. ON HAND (20-20)	VALUE OF 20-20	BAL. FORW.	REC'D	TOTAL ACT (10-10)	USED	BAL. ON HAND (10-10)	VALUE OF 10-10
Apple, unsweetened sauce	Lbs.	16		16	1	15	4.35	15		15		15	4.35	15		15		15	4.35
Baking powder	Cans	5		5	1	4	1.24	4		4		4	1.24	4		4		4	1.24
Bacon, issue	Lbs.	20	40	60	51	9	1.84	9	45	54	45	9	1.84	9	63	72	42	30	6.30
Beans, issue , R. kidney	Lbs.	50		50	20	30	1.50	30	30	10	20	10	2.00	20		20		20	1.00
Beans, stringless	Cans.	19		19	2	17	3.59	17		17		17	3.59	17		17		17	3.59
Beans, dry , blackeye	Lbs.	20	100	120	50	70	3.60	70		40	15	25	3.00	25		75	15	60	2.40
Beans, lima	Cans	50		50	10	40	2.40	40		40		40	3.15	40		38	15	20	1.00
Beef, fresh	Lbs.								150	154	139	15	2.70	15	182	177	112	65	11.70
Beef, corned	Cans														66	66	66	6	1.82
Bread, soft	Lbs.		100	100	100				90	95	98				66	66	66	6	1.82
Butter	Lbs.	8	60	72	48	24	6.24	24	60	88	53	25	6.50	25	82	57	37	20	6.20
Cabbage	Lbs.	25		25	25				50	50	10	40	80	40		40		40	4.00
Cheese cheese Pimentos	Pkgs.		24	24		24	2.16	24		24		24	2.16	24		24		16	1.60
Cheese cheese Carrots	Cans.								6	6		6	3.5	6		6		6	6
Cheese cheese Cherries	Cans.								6	6		6	3.5	6		5	2	3	1.47
Cocoa, br.	Cans	5		5	1	4	1.76	4		4		4	1.76	4		4		4	1.76
Coffee, roasted coffee	Lbs.	60	20	80	40	40	3.20	40	20	60	45	15	1.25	15	60	75	40	35	2.80
Corn, #2	Lbs.	18	24	42	13	29	1.38	29	24	57	20	27	1.62	27	24	51	11	40	2.40
Cereals Cereals, asst	Pkgs.	300		300	50	250	5.00	250	250	100	150	50	3.00	150	300	250	50	250	5.00
Corn meal	Lbs.	75		75	5	70	1.40	70		70	5	65	1.30	65		65		65	1.30
Cheese Noodles	Pkgs.								20	20	12	8	4.0	8		8		8	4.0
Eggs	Doz.	26	120	146	101	45	11.70	45	60	105	75	30	2.80	30	60	90	60	30	2.80
Flavoring extract Mapleline	Bots.	2		2		2	1.72	2	2	4		2	1.72	2		2		2	1.72
Flavoring, extract, V.	Bots.	1		1		1	1.12	1		1		1	1.12	1		1		1	1.12
Flour, issue	Cans	300		300	300			400	400	150	250	250	2.50	250	400	200	200	250	2.50
Hominy, lys.	Cans	7	24	31	3	28	1.68	28		28	4	24	2.40	24		24		24	2.40
Jam, assorted, #10	Cans	21		21	5	16	3.12	16		16	3	13	1.31	13		13		13	1.31
Lard, issue	Lbs.	45		45	10	35	3.15	35		35	10	1.35	1.35	1.35		100	115	40	7.50
Milk, evaporated	Cans	46	46	92	24	114	5.00	114	46	153	109	44	1.40	109	154	203	153	40	5.00
Milk Hominy grits	Cans	24		24	10	14	3.4	14		14	4	10	6.0	10		10		10	6.0
Oats, Rolled	Cans	25		25	4	20	1.80	20		20	3	17	1.19	17		17		17	1.19
Onions Tomatoes, #2	Bots.		24	24	13	11	1.87	11		11		11	1.87	11		11		11	1.87
Onions Pork	Bots.								68	68	32	36	6.12	36		68		68	6.12
Onions Apples	Bots.								6	6	6			6		6		6	6
Onions, fresh	Lbs.	50		50	45	5	1.0	5	100	106	55	50	1.00	50		50		50	1.00
Peaches, unsweetened #2	Lbs.	12	24	36	5	34	4.12	34		34	15	19	1.95	19		19		19	1.95
Pears	Cans	17	24	41	24	17	1.63	17	24	51	15	26	2.34	26	29	50	20	30	2.40
Pineapple Pineapple, #2	Lbs.		24	24	3	21	3.15	21		21	11	10	1.70	10		10		10	1.70
Pickles Pickles, SM	Cans	2		2		2	1.56	2		2		2	1.36	2		2		2	1.36
Pickles, cucumber	Gals.	12		12		12	5.09	12		12	1	11	4.62	11		11		11	4.62
Pineapple	Cans	5		5		5													
Potatoes, fresh	Lbs.	200		200	180	20	4.0	20	500	520	320	200	4.00	200	700	400	300	600	12.00
Prunes, fresh, #10	Lbs.	5		5	3	2	.74	2		2	1	1	.37	1		1		1	.37
Rice	Lbs.	40		40	20	20	6.0	20		20	10	10	3.0	10		10		10	3.0
Salmon Nahi	Pkgs.								6	6	1	5	.50	5		5		5	.50
Salt, issue, table	Lbs.	12		12	10	2	1.0	2	24	26	11	15	1.75	15		15		15	1.75
Sauerkraut	Cans	5		5	8	1	1.84	1		1		1	1.84	1		1		1	1.84
Sirup	Cans	3		3	2	1	.83	1		1		1	1.0	1		1		1	1.0
Sugar, granulated	Lbs.	400		400	150	250	10.00	250		250	165	85	3.40	85	200	285	85	200	8.00
Sugar, powdered	Lbs.	14		14	18	18	1.08	18		18	18	1.08	1.08	1.08		18		18	1.08
Tes, black or green	Lbs.	10		10	10	10	4.20	10		10	10	4.20	4.20	4.20		10		10	4.20
Tomatoes	Cans	10		10	2	8	2.2	8		8	4	2.8	2.8	2.8		8		8	2.8
Vinegar	Gals.	7		7	7	7	2.31	7		7	7	2.31	2.31	2.31		7		7	2.31
Yeast, compressed	Lbs.	1	4	5	3	2	.26	2		2	5	1	.13	1	6	7	4	3	.39

ADDITIONAL ARTICLES NOT LISTED ABOVE WILL BE ENTERED BELOW

Crackers	Pkgs.															10	10	4	6	1.56
Macaroni	Lbs.	25		25		25	1.85	25		25	10	15	75	15	10	25	15	10	50	
Spaghetti	Lbs.	25		25	20	5	3.5	5		5		5	3.5	5	20	25	10	15	7.5	
Ice cream salt	Lbs.	175		175	50	125	3.00	125		125	50	75	3.00	75		75		75	3.00	
Cheese, Swiss	Lbs.	10		10	5	5	.95	5		5	5					22	22	7	15	2.86
Ham, S.P.	Lbs.	35		35	19	16	3.44	16	35	51	51					51	51	51		
Salt pork	Lbs.	15	22	37	15	22	3.08	22		22	17	5	7.0	5		5		5		
Apples, fresh	Bu.	42		42	15	1	1.44	1	2	3	2	1	1.40	1		1		1		
Oranges, fresh	Crs.	1		1	1	1	1.00	1	1	1	1	1	1.00	1		1		1		
Tomatoes, fresh	Crs.	42	1	43	1	44	9.00	44	1	45	2	47	9.00	47		47		47		
Peppers, bell	Bu.	42		42	1	1	1.00	1	1	1	1	1	1.00	1		1		1		
Relish spread	Gals.	1		1		1		1		1		1		1		1		1		
Chili con carne #10	Cans	2		2	1	1	.84	1	6	7	1	6	5.74	6		6		6	5.74	
Corn beef hash #10	Cans	7		7	7	7	4.97	7		7	1	6	3.74	6		6		6	3.74	
Spinach #10	Cans	2		2		2		2	6	6	1	5	1.45	5		5		5	1.45	
Salmon #1	Cans	10		10	10	10	1.70	10		10	10	1.70	1.70	1.70		10		10	1.70	
Beans, baked #2	Cans	22		22	3	19	3.09	19		19	19	2.09	2.09	2.09		19		19	3.09	
Olives, ripe #2	Bots.	6		6	6	6	3.4	6		6	6	3.4	3.4	3.4		6		6	3.4	
Mustard	Bots.	35		35	35	35	2.50	35		35	35	2.50	2.50	2.50		35		35	2.50	
Hot sauce	Bots.	14		14	14	14	1.76	14		14	14	1.76	1.76	1.76		14		14	1.76	
Catsup	Bots.	5		5	3	2	1.00	2		2	3	1.20	1.20	1.20		3		3	1.20	
Tuna fish	Cans	28		28	28	28	4.36	28		28	7	21	3.52	21		21		21	3.52	
Asparagus tips	Cans	7		7	7	7	1.40	7		7	7	1.40	1.40	1.40		7		7	1.40	
Pears	Cans	37	24	61	9	52	7.36	52		52	16	36	4.40	36		36		36	4.40	
Tomato juice	Cans	8		8	8	8	3.48	8		8	3	8	1.65	8		6	11	3	8	3.48
Coconut, shredded	Pkgs.	24		24		24	2.64	24		24	19	5	3.5	5		5		5	3.5	
Beans, issue	Lbs.															100	100	10	90	6.00
Tomato puree #10	Cans	12		12	12	12	3.72	12		12	12	3.72	3.72	3.72		12		12	3.72	

NOTE—The officer in charge of the mess will, at the end of each ten-day period, personally make a physical inventory and will verify all entries in each column for that period.

Column 5. The aggregate daily expenditures for the ten-day period (Column 6) are deducted from Column 5, resulting in the entries in Column 7, which are evaluated in Column 8. For the second and third ten-day periods corresponding entries are made in Columns 9 to 14 and 15 to 20, each inclusive, respectively. The values of the stock on hand at the end of each ten-day-period-check are totaled at the bottom of the page. This value for the end of the month is reentered on the face of the form and added, algebraically, to the corresponding entry from the record for the previous month to indicate the monthly increase or decrease in the stock on hand. This latter figure compared to the credit or debit entry from Column 16 for the last day of the month shows the gain, or loss, in mess operations for the month. The record is kept by the mess sergeant and checked by the mess officer.

Monies received by the organization from the quartermaster as ration savings are held in custody by the organization commander. Such funds can be expended for food and refreshments, only. All receipts and expenditures are recorded in the Company Council Book and supported by proper vouchers.

HOSPITAL MESSES

Hospital messes are maintained for the medical department enlisted force on duty and for the patients in hospitals. An officer is usually detailed in charge of the mess, and a noncommissioned officer is appointed as mess sergeant to assist him. The mess officer is responsible for the management of the mess, the finances, and the accounts pertaining thereto. The personnel required to run hospital messes include cooks, assistant cooks (who have specialists' ratings), and kitchen police. For large hospitals several types of kitchens are necessary, such as kitchens for the general mess, a special diet kitchen, and ward diet kitchens. Hospital messes are financed by funds received from the ration allowances of the enlisted personnel on duty and the patients sick in hospital plus monies received by the hospital fund. Hospitals usually maintain a separate mess for nurses.

Diets. The mess officer prepares daily menus and submits them to the commanding officer of the hospital for approval. The ward officers indicate on the daily diet slips the diets required to meet the needs of their respective wards. Diets in hospitals are classified as regular (full), liquid, light, soft, and special.

Regular diets are the full diets intended for patients whose condition will permit the ingestion of a full, well-balanced meal. It should contain all the dietary requirements—calories (3000), carbohydrates, proteins, fats, minerals, vitamins, and bulk—to meet the needs of a normal, healthy soldier.

Liquid diets are intended for patients acutely sick, generally those running high temperature (hyperpyrexia) or suffering from dehydration. The liquid diet is given to increase the fluid intake and to reduce the task of digestion to a minimum. They usually contain about 1500 calories and are not suitable for use over a protracted period of time. Feeding is frequent, usually every three hours while the patient is awake. The following articles are considered suitable for liquid diet: soups (vegetable and cream), fruit juices, gruels (barley, cracker, oatmeal), bouillon, beef-tea, broths (beef, lamb, chicken, oyster), albumens (orange, lemon, or plain), egg-nogs, ice cream (plain), milk, buttermilk, milk-shakes, tea (hot or iced), coffee (hot or iced), and cocoa.

Light diets are intended for patients requiring fewer calories than those provided in the regular diet. As a step between the liquid and regular diets, they are easier to digest than the latter. Fried foods or foods cooked in deep fat must not be served. Other foods not to be used are pies, pastries, hot breads, biscuits, hot cakes, and gas forming foods or vegetables difficult to digest such as cabbage, turnips, onions, cauliflower, Brussels sprouts, and broccoli. The following foods may be used as a basis in selecting the light diet:

Soups: broths, vegetable soups, or cream soups.

Meats: baked, broiled or creamed chicken; baked or broiled fish (meat substitute); roast lamb or broiled lamb chops; crisp bacon; creamed or stewed oysters; coddled, poached, soft boiled, or scrambled eggs (meat substitute).

Starchy dish: baked or mashed white potatoes, rice, grits (hominy).

Green vegetables: spinach, beets, sugar peas, squash, string beans, lettuce, celery, tomatoes, and carrots,

Salads: lettuce, celery, tomato, canned fresh fruit, and banana.

Bread: toasted, crisps, and crackers.

Desserts: fresh, ripe fruit; canned fruit; stewed fruit; custards, curded milks; or creams; ice cream; puddings; and simple cookies.

Beverages: tea, coffee, milk, buttermilk, cocoa, and chocolate and milk preparations.

Soft diets are used to span the few meals between the time when the patient's needs and appetite require more than a liquid diet but is as yet unable to take the more solid constituents of the light diet. Any foods included in the liquid diet may be given, but these may be supplemented by some easily digested foods in the semi-solid and solid forms: cereals such as cream of wheat, grits, oatmeal, and cooked wheat; mashed and baked potatoes; soft boiled, soft scrambled, or poached eggs; dry toast, milk toast, crackers, rye crisp; gelatins (plain); ice cream; baked or boiled custard; apple sauce; tapioca; baked apple (skin removed); milk or cream curds; and wholesome puddings.

Special diets are prepared upon order from the ward surgeon who prescribes each item of the diet and the amount of each item, except in large hospitals where prepared diet lists are maintained and the services of a dietician are available.

Patients who are able to attend the regular mess in the mess hall should do so, as the handling of trays for ambulatory patients is unnecessary work. Trays should be neatly prepared, hot foods served hot, and cold foods served cold. An attractive food tray stimulates the appetite of the patient. Serving an acutely sick patient an excess of food beyond his needs or desires is abhorrent to the patient and wasteful of food. The edible food waste should not exceed six ounces per person in a day. Limiting the food served to the actual requirements of the patients concerned will assist in lowering the portion of edible waste from the hospital mess.

Commutation of Ration Allowances for Patients in Hospitals. The ration of enlisted men, applicants for enlistment, prisoners, civilian employees of the Army entitled to rations, and discharged soldiers held in hospital for treatment, while patients in a hospital, is commuted at the following rates: (1) At establishments maintained for the treatment of tuberculous patients or for tuberculous patients in other hospitals, at the actual cost of the ration, plus 90 per cent; (2) For all cases other than tuberculous, at the actual cost of the ration, plus 50 per cent.

Hospital Mess Charges. (1) Officers at station hospitals, \$1; at general hospitals, not to exceed \$1.50; (2) Civilian employees and veterans' administration beneficiaries on the status of enlisted men are charged at the same rate as enlisted men plus 10 cents per day. Those on the status of officers are charged as for officers.

Mess Accounting. Daily transactions of the mess are accounted for on the mess account (Form 74 M. D.) which is kept by the mess sergeant. The daily balance thereon exhibits the financial status of the mess. Purchases are made by the mess sergeant under the direction of the mess officer and are paid for at the end of the month. Subsistence stores received and issued from the storeroom are carefully checked. A storeroom attendant keeps an inventory of the supplies on hand. Regulations require that a certain per cent of the ration allowance be spent at the commissary. Necessary articles of diet for the sick in hospital, however, may be purchased in the open market. The following are the essential precautions to be taken in the financial administration of the hospital mess:

1. The daily expenditures should not exceed the daily income except in so far as it is advisable to take advantage of market conditions to increase the inventory of the stock rooms.

2. Stock room supplies should not be allowed to fall unduly. Over issues therefrom are equivalent to over expenditures of cash funds.

3. Accurate check into and out of the storeroom.

4. All bills should be rendered monthly and no outstanding obligations permitted.

The Hospital Fund. A hospital fund is maintained in every hospital for the purpose of messing the hospital personnel and patients and providing authorized and legitimate recreation and entertainment.

The hospital fund is derived from: ration allowances of patients and enlisted force on duty; dividends from the post exchange; sales from post garden; money received for the subsistence of officers and civilians treated in hospitals; the sale of property purchased

with the hospital fund or products pertaining to the hospital fund; and from nurses subsisted in a mess conducted by the commanding officer.

The hospital fund is kept by the surgeon or an officer detailed for this duty who is held responsible for the loss of any portion of the fund not deposited in the bank or in the hospital safe. Expenditures therefrom are limited to the purchase of food and other articles for the benefit of the patients and enlisted men on duty in the hospital. Shares in the post exchange may be purchased or investment may be made in government bonds with funds of the hospital fund. A financial statement of the hospital fund is prepared monthly and audited by the hospital council, the proceedings of which are recorded on the retained statement of the hospital fund (Form 49 M. D.). The hospital council consists of the three senior officers on duty at the hospital.

Durable property purchased by proper expenditures from the hospital fund is recorded and accounted for each month in the space provided therefor on the hospital fund statement.

CHAPTER X

SUPPLY

Introduction. The necessity for an adequate and dependable system of supply is very important in the Army, both under the conditions of active campaign and in garrison. During an operation in the field, the placing of essential supplies at the places needed, in sufficient quantity, and at the time required will have much to do with the success or failure of the commander's plan. The lack of adequate supplies at a crucial time may, indeed, change a victory into unavoidable defeat. In normal garrison service, or in the Zone of the Interior in time of war, the problem has the same degree of importance, although in the latter case failure may not have so immediate or disastrous consequences.

Supply is an important subject for the medical officer. His department is itself a supply service in that it secures and distributes medical supplies for the use of its own units and installations. It is concerned with the routine supply of its own units for the articles prescribed in Tables of Allowances, Tables of Basic Allowances, and other items which are necessary to satisfy special needs.

Necessarily, the system of supply which is prescribed for these divergent needs differs very widely. This chapter contains useful information on the subject, both in campaign and in garrison, with especial reference to the problems encountered by the leader of a small unit. The subject is presented under the following headings: Supply in the Field and in Combat, Supply in Garrison, and Medical Property and Supplies. The subject of Supply and Evacuation of Large Units is presented in Chapter VII, Part I.

SUPPLY IN THE FIELD AND IN COMBAT

Principles of Supply. There are five fundamental principles of supply, as follows:

1. Combat troops must be furnished continuously with the proper kind and quantity of supplies.
2. Combat troops must not be encumbered with unnecessary supplies.
3. Supplies must be echeloned in depth.
4. The impetus of supply comes from the rear.
5. The organization for supply must be flexible, mobile, and simple.

Classification of Supplies. For simplicity and convenience of administration, supplies required by troops in the field are divided into four classes:

Class I. Supplies which are consumed at a relatively uniform rate and which do not necessitate special adaptation to meet individual requirements—subsistence and articles of a similar nature.

Class II. Supplies which, though consumed at an approximately uniform rate, are for the personal use of the individual and require special arrangements to meet individual requirements—clothing, gas masks, and similar articles. Individual and organization equipment prescribed by *Tables of Basic Allowances*. (War Department Tables which list the basic supplies allowable for units and individuals).

Class III. Motor fuels and lubricants (air and ground).

Class IV. Supplies and equipment for which allowances are not prescribed; articles of an exceptional nature; supplies and equipment, the distribution of which depends upon the conditions imposed by the operations—fire-control apparatus, radio apparatus, air corps supplies, medical supplies, and engineer construction materials.

Class V. Ammunition.

Organization for Supply Within the Regiment. General. When the regiment enters the field, it has the equipment and supplies prescribed in the *Tables of Basic Allowances*. Much of this property is distributed among and carried on the person of the individual soldier. Certain items of organizational equipment and supplies, however, must be moved in transport facilities assigned for that purpose. This transportation, with its operating and accompanying personnel, is grouped to serve the companies, battalions, and the regiment. Such groups of vehicles are known as *trains*. Additional personnel is required for obtaining and distributing the supplies and equipment needed for replenishment and replacement. This supply personnel and equipment are included in organizations within the regiment. They are allotted spheres of responsibility so as to provide

for the continuous supply and transport required by the combat troops during the execution of the varying tactical missions imposed by the commander.

Trains. The *train* of a unit is that portion of the unit's transportation with its accompanying personnel which operates under the immediate orders of the unit commander in supply, evacuation, and maintenance. The designation of a train is the same as that of the unit, as *1st Infantry Train*.

A train may be subdivided according to the service in which it is engaged; for example, *Ammunition Train, 1st Infantry*; *Kitchen Train, 1st Battalion, 1st Infantry*; or *Medical Train, 1st Battalion, 1st Field Artillery*. For divisions and larger units the term *train* will seldom be used as it will be found more convenient to refer to the particular service unit concerned. Thus the term *1st Medical Battalion (Regiment)* will be used rather than *1st Division Medical Train*.

The terms: *service, field, and combat trains* are no longer used.

The Regimental Supply Officer. The regimental staff officer for supply (S-4) is responsible to the regimental commander for the proper functioning of the supply system in the field, in accordance with whatever tactical and supply plans are adopted. S-4 is charged with the preparation of plans and policies pertaining to, and the supervision and co-ordination of all matters concerning supply, transportation, evacuation, and maintenance of equipment for the regiment as a whole and its subordinate units. He accomplishes his tasks by the exercise of command control over the service company and through administrative instructions to the entire command, issued in the name of the commander. In combat, his sphere of activity includes the entire regimental area. Although his staff duties require him to be constantly in touch with the command post and the tactical situation, he must, in his operating capacity, be frequently in his office, which is located with the service company where all of the supply officer personnel is located. He must inspect administrative and supply installations throughout the area. He must establish close relationships with the personnel which controls supply at superior headquarters, with subordinate units, and with the various supply agencies serving the regiment.

The Service Company. The primary mission of the regimental service company is to supply the regiment. Its organization is a company headquarters, headquarters platoon, and a transportation platoon. The supply section of the headquarters platoon provides the personnel for receiving and distributing supplies for the regiment, for the maintenance of supply records, and for the repair and upkeep of material. The transportation platoon consists of the personnel, animals, and vehicles necessary to operate the field and combat trains. The organization of the service company of a medical regiment can be found in Chapter II.

The Battalion Supply Officer. Battalion supply officers and a supply section for each battalion are included in the service company of the infantry regiment. They function for each battalion in the same manner as the regimental supply officer (S-4) for the regiment. The sphere of activity of a battalion supply officer is much smaller, however, and his facilities more limited. He ascertains the supply requirements of the battalion and attached units through personal contact. He anticipates future needs. He insures timely delivery of the supplies procured for his battalion by the regiment, by means of the transportation and personnel furnished from the regimental service company.

The Company Supply Officer. Within the company, the supply officer is either the company commander himself or a company officer designated by him. The company supply officer is assisted by the supply and mess sergeants, the cooks, and artificers. He accomplishes the supply of his unit by means of this personnel, the company trains, and the personnel and transportation furnished from the higher unit combat train. The supplies come from those obtained and carried by the regiment.

Supply Procedure Within the Regiment. General. Supply procedure in the field adheres to the fundamental principles of supply which were stated above. The routine requirements of troops are supplied automatically; other requirements should be anticipated when practicable, and provided without a request from the troops.

The regimental supply plan, prepared by S-4, is based on orders promulgated by higher authority, the tactical plan of the regimental commander, and the terrain. The formulation and scope of battalion and separate company supply plans correspond, in general, to

those of the regimental plan. Hence, supply problems are coordinated with the tactical operations ordered, and early provision is made for a satisfactory solution in each instance.

The infantry regiment carries, on individuals and in its trains, all the supplies essential to entering combat. The regiment carries no reserves except Class I supplies and a small amount of ammunition. Replenishment of Class I supplies is a matter of daily necessity. The limited supply of ammunition carried is ordinarily sufficient for initiating combat and sustaining fire action until the ammunition replenishment service in rear can become effective. Ammunition must be forwarded from rear to front in a systematic manner in order to replace that expended in battle.

Since every need cannot be foreseen by supply agencies, requisitions must be presented. A requisition is a request for supplies. It may emanate from any element of a command at any time. Within the regiment, it may be in any form, such as a telephone request, a written or oral message by runner, or an empty ammunition vehicle. Each legitimate request must be honored throughout the chain of command, whenever possible. Normally, requisitions from all units of a regiment are sent to, and consolidated at, the office of the regimental supply officer. The consolidated requisitions are then sent to the appropriate (normally divisional) supply agency and the supplies are drawn by the regiment from designated distributing points.

Class I Supplies. The procedure for receiving and distributing Class I supplies is basically the same in all operations of a campaign.

Daily strength reports are submitted by the companies to battalions and forwarded to the regiment where they are consolidated and sent to the next higher administrative unit. At each headquarters the S-4 concerned receives a copy pertaining to that unit. This daily strength report is the only requisition required for Class I supplies. Higher authority prescribes the hour and place where the regiment is to obtain its daily supply. Delivery may be made to the regiment's train bivouac, or at some other distributing point, and transported by regimental vehicles. Since delivery is made on the basis of strength reports previously submitted, adjustments may be made in order to compensate for changes in strength. This is accomplished by the regimental supply service. In moving situations, supplies must not be permitted to accumulate beyond capacities of the regimental trains. Normally, the train carries one day's subsistence for men and animals; one *ration*. The kitchen carries one food ration. One additional ration of food and grain can be carried on the unit train if necessary.

Distribution within the regiment begins on arrival of these supplies at the unit train bivouac. The rations, received in bulk, are sorted and apportioned to the unit kitchens. In motorized units, the kitchens are normally set up in the train bivouac. In animal-drawn units, they may be farther forward. Combat conditions ordinarily prohibit daylight movement of vehicles in forward areas; hence the issue of food to troops during daylight is impracticable. Kitchens customarily prepare meals so that the forward movement for final distribution begins at dark. In motorized units, kitchen trucks, loaded with food containers, are normally grouped and moved under regimental control to the *regimental point of release*, which is a location convenient to all battalions and separate companies. There the trucks are released to those subordinate units at the hour previously specified. The trucks are advanced, under battalion control, to *battalion points of release*, and turned over to company representatives who guide them to *mess locations* as close to the troops as possible. Troops may be fed there, or carrying parties may move it still farther forward, if necessary. One truck usually feeds two companies and retrieves the food containers. The trucks return to the kitchen bivouac and later repeat this process for the distribution of a hot breakfast and a cold lunch for the following day, which the kitchens have prepared during the night. This distribution is timed so as to permit the trucks to clear the forward area just prior to daylight. The responsibility of the regimental supply service begins when the regiment receives its supplies from the higher unit in rear, usually the division, and ends when it delivers these supplies in proper quantities to the control of its battalion and separate unit supply services. The responsibility of a company supply service begins when it accepts these supplies from its battalion or regiment, and ends when it has completed issue to the soldier or the animal.

Each echelon should strive to simplify the task of the next lower echelon by making supplies easily accessible.

Water for canteens and kitchens is procured locally, when it is practicable to do so. It is chlorinated. When the local water supply is contaminated or limited, water is obtained from distributing points, operated by engineer troops, and distributed with the rations.

Forage for animals and gasoline and oil for motors are distributed to consumers in forward areas under cover of darkness in a manner similar to the ration distribution. Every opportunity is utilized to replenish units or vehicles in rear areas with these supplies during the day.

Ammunition. The replenishment of ammunition is not a matter of daily routine, but depends directly upon the tactical situation. Probable needs must be estimated to prevent sudden shortages.

In offensive combat the extra ammunition on the unit train is issued, wholly or in part, to the troops before deployment is effected. The vehicles thus emptied are assembled at the battalion distributing point and directed, by the battalion S-4, to the regimental ammunition distributing point. From there, the regimental ammunition officer sends or conducts the vehicles, singly or in groups, to the brigade distributing point where they are refilled. No requisitions are required. The empty vehicle itself is a requisition. When refilled, and ammunition vehicles are habitually kept filled, these vehicles are returned to their respective units via the same channels and control; or they may be retained under regimental control at or near the regimental distributing point, where they are available to battalions or separate units. From the battalion distributing points, the ammunition vehicles are moved to company ammunition distributing points, if combat conditions permit advance vehicular movement. If not, carrying parties are utilized from reserve or supporting troops. Within the company, ammunition is carried forward and distributed to the foremost elements in the manner, and by the individuals, designated by the company commander. The regimental ammunition officer advances the ammunition train by bounds along the route of advance, keeping as close to the assault echelons as the tactical situation and the terrain permit. He constantly pushes loaded vehicles up close behind the battalions and separate units and promptly receives and refills all empty vehicles. Ammunition is seldom, if ever, dumped at regimental or battalion distributing points. These are merely rendezvous points for ammunition vehicles.

In most defensive positions, an initial supply of ammunition is placed on the position. The amount dumped depends on the tactical situation. Usually one refill of combat and combat train ammunition, in addition to that already carried, is ample. This initial supply should fulfill the daylight requirements of troops on the position. Resupply is effected at night if daylight traffic is impracticable.

Engineer Supplies. The principal engineer supplies required by infantry troops in mobile warfare consists of tools and materials for the organization of the ground in a defensive situation. Supply officers ascertain the tactical requirements and arrange for the delivery of these supplies to engineer distributing points in forward areas. From these points, carrying parties distribute the materials on the position.

Medical Supplies. In the usual case, requisitions for medical supplies are submitted through the unit supply officer. Medical supplies are forwarded by the medical supply personnel of the medical regiment or medical battalion to the regimental supply officer of the regiment submitting the requisition. The regimental supply officer who receives the supplies makes the distribution within the regiment. In emergencies during combat, medical supplies are forwarded from medical regiments or medical battalions through collecting stations by litter bearers, ambulances, or any other means to the attached medical personnel requesting these supplies.

Other Supplies. The necessity for drawing supplies, other than those enumerated, is exceptional while in contact with the enemy. When the need does arise, it is usually for a single item or small quantities. The regimental supply officer ascertains the needs and arranges with the supply agencies in rear of the regiment for delivery, either through channels or direct to the unit needing the supplies. In combat, signal supplies and items of ordnance equipment are furnished by this method. When a regiment is out of close

contact with the enemy, all supplies are distributed in a manner similar to that employed in the distribution of Class I supplies.

SUPPLY IN GARRISON

General. The discussion which follows covers the normal garrison system of supply. It is the system which is normally used in time of peace, whether the troops are in garrison or in the field on maneuvers. It is the system which will be used in time of war so long as troops are in the Zone of the Interior, i.e., in cantonments or camps undergoing training and preparations for combat. The distinction between this method and the one heretofore discussed is that, in the field, the supply of most items needed by the troops is automatic, and the use of requisitions, shipping tickets, memorandum receipts, and similar forms is of necessity entirely eliminated.

Supply Branches. The supply branches, together with the type of supplies for which each is responsible, are as follows:

Quartermaster Corps: Subsistence, clothing, shelter, transportation, and other items common to all branches.

Ordnance Department: Arms, ammunition (except chemical ammunition), fire control instruments, and similar items.

Corps of Engineers: Compasses, mapping and sketching equipment, and like equipment.

Medical Department: Medical supplies and hospital equipment, first aid packets, and similar supplies.

Signal Corps: Telephones, radios, and other communication equipment.

Chemical Warfare Service: Chemical ammunitions, gas masks.

Air Corps: Airplanes and parts, and particular Air Corps equipment, such as flying suits and parachutes.

To a certain extent the various procuring agencies listed above are also using services. For example, the Medical Department is the principal user of medical supplies.

Definitions. By *accountability* is meant the requirement of keeping strict account of all supplies furnished, i.e., keeping a stock record account. Post and Regimental (and Separate Battalion) Supply Officers have accountability—that is, they maintain stock record accounts.

A *stock record account* is a system of bookkeeping by property officers and by unit supply officers maintained to keep track of all supplies issued to the various subordinate units. It consists of Stock Record cards, Account of Property on Memorandum Receipt, Shipping Tickets, Memorandum Receipts, and other debit and credit vouchers. It must balance at all times.

Responsibility for property includes strict supervision over the receipt, care, use, and safe-keeping of property. Every officer and soldier who is in receipt of any government property whatever is responsible for it. He may be required to pay for its loss or damage in the event that he cannot show definitely that he used reasonable care and complied with all pertinent regulations and orders in order to prevent such loss or damage.

Expendable property is that sort which is normally consumed in the process of being used, such as ammunition, fuel, and similar items; or which by its use becomes an integral part of other property, such as repair parts for rifles. Some other inexpensive items are considered expendable which, while not necessarily consumed by use, are not very durable and are easily broken through no fault or negligence on the part of anyone concerned.

Non-expendable property is any property not considered expendable as defined above.

Post Property Officers. At each post, camp, and station there is a Post Property Officer for each of the various kinds of property required by the units serving at that post; a Quartermaster Property Officer, Signal Property Officer, Ordnance Property Officer, and others. On smaller posts, the Quartermaster may handle all the different types of property as the Post Supply Officer, or a line officer may be detailed as Property Officer for any one or more of the different classifications of property needed. In any case, each property officer is accountable and maintains a separate stock record account for property of each different supply branch.

Blank Forms Used. For convenience, blank forms have been devised for use in requisitioning, shipping, receipting for, and accounting for property.

A *Requisition* (War Department, Q. M. C. Form No. 400) is a request for the issue of certain supplies. There are different blanks for use in requisitioning different types of property; clothing, glass and chinaware, cleaning and preserving materials, and like articles. The proper blank form should be used, but in the absence of such form any properly signed request which gives the essential data will be accepted. Separate requisitions have to be made out for property of the different supply branches, and likewise, separate requisitions are submitted for property to be drawn from different accountable officers.

A *Shipping Ticket* (War Department, Q. M. C. Form No. 434) is a report that certain items as listed thereon have been furnished to the designated unit, together with the receipt of the supply officer of that unit. It is a voucher to the stock record accounts of both the shipping agency and the receiving officer. It is used only in transferring property from one accountable officer to another. Within the regiment, (or separate or detached battalion) the supply officer is the only one who receives property on a shipping ticket.

A *Memorandum Receipt* (Q. M. C. Form 487) is just what its name implies—a receipt for property issued or turned in.

The *Stock Record Card* (Q. M. C. Form 424) is the basic record of the Stock Record Account maintained by the accountable officer, showing dates of receipt or issue of the property, voucher numbers, and a running balance. A separate card is maintained for each of the hundreds of items for which the supply officer may be accountable.

The *Account of Property on Memorandum Receipt* (Q. M. C. Form No. 488) is a part of the Stock Record Account, showing exactly to whom the various articles accounted for on the Stock Record Card are charged.

The *Inventory and Inspection Report* (W. D., I. G. D., Form No. 1) is a report of property which has become worn out or damaged through fair wear and tear, listing items to be inspected, and carrying the inspector's recommendations as to the disposition of the property. An approved *I and I Report* indicates the ultimate disposition of the property listed—destruction, salvage, or reclamation of serviceable parts. It authorizes the accountable officer to drop the property from his stock record accounts and relieves the responsible officer from further responsibility. A separate report is prepared for property of the different accountable officers.

The *Statement of Charges* (W. D., A. G. O. Form No. 36) is a statement signed by the company commander, showing the loss or damage of certain items, and naming the individual or individuals required to pay for such loss or damage. It is used only when the responsibility for loss or damage has been accepted by the individuals concerned, or when such responsibility has been duly fixed by a report of survey. A Statement of Charges, properly signed, is authority for the accountable officer to drop such property from his stock record account and to issue credit to the responsible officer for it. A separate statement must be prepared for property of the different supply branches and for property drawn from different accountable officers.

A *Report of Survey* (W. D., A. G. O. Form No. 15) is a report on property which has been lost, destroyed, or rendered unserviceable other than by fair wear and tear. It is submitted for the purpose of determining the responsibility for loss, destruction, or damage, and for recommendations as to the disposition of the property. An approved Report of Survey becomes a voucher to the stock record account of the accountable officer, or becomes a sub-voucher to the *I and I Report*, if submitted. As in the case of the *I and I Report* and the *Statement of Charges*, separate reports must be submitted for property of the different supply branches and for property drawn from different supply sources.

The *Over, Short, and Damaged Report* (Q. M. C. Form No. 445) is used for the purpose of picking up on a stock record account any public property found which should be accounted for. For example, a company commander discovers that, although he is charged with 175 haversacks, he actually has a total of 177. The two extra haversacks are reported on an *O, S, and D Report* to the regimental supply officer, who is accountable for such property. The supply officer picks up the two haversacks on his stock record account and either requires the company commander to sign for them, or to turn them in. This form is also used to correct minor discrepancies which may occur in nomenclature. For example, a company commander finds that he has, instead of the 200 cotton pillows charged on his memorandum receipt, 175 cotton pillows and 25 feather pillows. In this case the

items are entered on an *Over, Short, and Damaged Report* in order that the records may be amended to agree with the facts.

Basis of Issue. There are three documents on which all issues to a regiment are based: the Table of Allowances, the Table of Basic Allowances, and the Table of Organization for the unit concerned. The Table of Allowances and the Table of Basic Allowances specify the items to be issued to individuals and groups within the company (as: 1 per officer, 4 per authorized cook, 2 per squad). This requires that the *Table of Organization* for the particular unit be studied in order to determine the total quantities needed.

The *Table of Allowances* (T/A) lists the items of equipment required for the use of individuals and of organizations in garrison, as distinguished from those used in field service; i.e., mess tables, beds, barrack chairs, kitchen stoves and similar articles. These items are drawn directly from the proper Property Officer of the post or camp, and that Property Officer retains accountability for them. In the event an organization leaves the post for an indefinite time, or is ordered away permanently, all these items must be turned in to the Quartermaster or other Property Officer from whom they were drawn.

The *Table of Basic Allowances* (T/BA) lists the items of equipment required for the use of individuals and of the organization in the field; those items which are required for the efficient combat functioning of the organization, such as field ranges, shelter tents, rifles, bayonets, field message books, and many others. These items are drawn through the regimental (or separate or detached battalion) supply officer, who is accountable for them. All these items are taken with the company when it leaves the post, either for field service or for a permanent change of station.

Chain of Supply. The chain of supply for articles issued under the T/A is direct from the company commander to the proper post Property Officer for that particular type of property—Post Quartermaster, Post Signal Officer, etc. Accountability for this property is retained by the respective post supply officers who furnish it, and the company commander has a memorandum receipt account with each of these post supply officers from whom he has drawn property. Requisitions for such property, however, must go through regimental headquarters for approval of the regimental commander.

The chain of supply for articles issued under the T/BA goes from the company commander to the regimental supply officer to the proper Post Property Officer concerned; i.e., the company commander requisitions such property from his own regimental supply officer, who consolidates all such requisitions, and submits a regimental requisition to the proper Post Property Officer for the necessary equipment for the entire regiment. This property is transferred to the regimental supply officer on a shipping ticket, and he becomes accountable for it. The company commander is issued the property on a memorandum receipt and receipts for it to the regimental supply officer. The company commander will thus have two or more memorandum receipt accounts covering the property which has been issued to his organization: one or more with the post Property Officer or Officers from whom he has drawn property under the T/A, and one with the regimental supply officer for property issued under the T/BA. The company commander is responsible, of course, for all property, regardless of its source.

Battalions and brigades are not usually in the supply chain, except in the case of a separate or detached battalion or brigade, in which case the supply officer assumes the duties outlined above for the regimental supply officer.

Supply Personnel Within the Regiment. The *Regimental Supply Officer (S-4)* is a member of the regimental commander's staff, and has the usual staff duties of coordination and recommendation, of making plans to carry out the commander's policies, and the supervision of the execution of such plans when approved. More specifically, he is charged with the following:

- a. He is accountable for all T/BA property in the regiment.
- b. He consolidates requisitions from lower units for all property for which he is accountable, making out consolidated requisitions and drawing such property for the entire regiment and distributing it to the companies in accordance with their requisitions.
- c. He exercises general supervision over other supply matters, checking requisitions for property under the T/BA in order to see that authorized allowances are not exceeded (particularly with regard to budget items). (Budget items consist of expendable articles and certain non-expendable items which are issued on a budget basis).

d. He makes such recommendations to the commanding officer as may be called for, or as he deems proper concerning supply matters; makes necessary plans to see that supplies are on hand when needed and within authorized allowances, and supervises the execution of such plans when approved.

e. In addition to his accountability for property, he is, of course, responsible for all property which he himself may hold, either on memorandum receipt to a post property officer, or property drawn under the T/BA but not as yet issued to a company or other organization of the regiment.

The Regimental Supply Officer is assisted by one or more assistant supply officers, and by the Supply Section of the Regimental Service Company. The Supply Section consists of the Regimental Supply Sergeant and the necessary clerical force to maintain the stock record account, prepare requisitions, and do other necessary clerical work. The Service Company of the regiment is the operating unit which furnishes the necessary personnel and transportation required to meet the supply needs of the regiment.

Records maintained in the Regimental Supply Office. In the regimental supply office are maintained the following records:

a. Stock Record Account, consisting of Stock Record Cards, Account of Property on Memorandum Receipt, Shipping Tickets showing T/BA property received or turned in, Memorandum Receipts for T/BA property held by companies and detachments, Statements of Charges, Reports of Survey, I and I Reports, and other debit and credit items.

b. Copies of consolidated requisitions for T/BA property.

c. The duplicate copy of all Memorandum Receipts signed by the supply officer for T/A property for which he is responsible.

d. Other records, returns, and reports as required by local conditions.

The Company Commander. The Company Commander is charged with full responsibility for the supply of his organization. Specifically, he is charged with the following:

a. He is responsible that his organization is fully equipped at all times in accordance with the appropriate Tables of Allowances and Tables of Basic Allowances. This will require periodic physical inventories of his property and more or less frequent inspections. It is his responsibility, in case of any shortage, that responsibility for the shortage is fixed, and that the necessary requisitions are submitted in ample time to secure replacement of needed items.

b. He is responsible for the serviceability of all property issued to his organization. This will involve frequent inspections, and the preparation of necessary *Inventory and Inspection Reports, Reports of Survey, and Statements of Charges* to account for the un-serviceability of any items of equipment.

c. He is responsible that the property issued his organization is used for the purpose for which issued, and in accordance with regulations and orders in force at the time.

d. He is responsible for the safe-keeping of all property issued to his organization.

e. He is responsible for the maintenance of necessary records within the company as to the receipt and issue of property, either for the use of the company as a unit, or for the use of individuals.

Company Supply Officer and Supply Sergeant. To assist the company commander in his duties connected with supply, another officer may be detailed as company supply officer, and to him is delegated general supervision over supply matters, particularly preparation of necessary requisitions and reports and maintenance of records. The company commander cannot require him, however, to sign for property issued to the company, or to accept responsibility for it. The supply sergeant, under the supervision of the company commander and the company supply officer, is held generally responsible for the receipt, issue, and safekeeping of the property issued to the organization.

Supply Records Maintained in the Company. The company commander has, of course, one copy of each memorandum receipt signed by him for property issued to his organization. This will show him exactly for what items he is responsible. The greater part of his property, however, is not kept in a supply room, but is issued out to members of the organization for their individual use or for the use of different groups within the company—office equipment to the orderly room, kitchen equipment to the mess sergeant. Any

property not physically in the supply room should be accounted for by a proper receipt signed by the person who has drawn it out.

The *Individual Equipment Record* (W. D., A. G. O. Form No. 33) is provided for the purpose of charging the individual soldier with articles of individual equipment, such as haversacks, shelter tents, rifles, bayonets, first aid pouches, and like articles. One form is maintained for each soldier. The soldier's initials on this form are his receipt for the property issued to him, and the officer's initials are those of the officer who witnesses the issue. It is to be noted that all items of equipment are shown on this form regardless of the supply branch from which it was drawn originally. It will be noted also that certain other items, such as towels, toilet sets, and other similar accessories, and certain items of clothing, such as mackinaws, which are issued in kind and not charged against the soldier's money allowance, are also entered on this form.

Items of organization equipment, as for example, desks, typewriters, kitchen equipment, should be receipted for by the person who has direct supervision over their use. In fact, it should be a firmly established rule that no one, not even the company commander, should remove any property from the supply room without signing a receipt for it. This is a protection to the supply sergeant as well as to the company commander, in case any question should arise as to individual responsibility for any given item of property. In addition to these receipts, and to the *Individual Equipment Records*, there should be maintained a file of receipts signed by the various supply officers for property turned in; copies of all statements of charges on which credit is obtained; copies of all *Reports of Survey, I and I Reports*, and *O, S, and D Reports*.

If records are maintained carefully as outlined above, the company commander can quite readily strike a balance at any time and easily determine just what property should be on hand, either actually in the supply room or in the hands of individuals of the company; and he can also account readily for any property which he cannot physically produce.

Semi-Annual Settlement With Accountable Officers. A settlement is made with each accountable officer with which the company has a memorandum receipt account in June and December of each year, and upon any change of responsible officers, provided the change is to be for longer than 30 days. The accountable officer prepares a new memorandum receipt, including all additional items issued since the last settlement, and giving credit for all items turned in for which credit has been given on a *Statement of Charges, Report of Survey, I and I Report*, and similar reports. The new memorandum receipt is signed by the company commander, after a thorough inventory of the property listed on it, and is returned to the supply officer or other accountable officer for his records. The old memorandum receipt is then returned to the responsible officer and destroyed.

Relief From Responsibility. A company commander (or other responsible officer) is normally not relieved of responsibility when absent for less than 30 days. If his absence is to be of longer duration, another officer is directed to take over the property. The original company commander, however, is not relieved of responsibility until his successor has actually signed a memorandum receipt for the property, or until any shortages have been accounted for by statement of charges or report of survey.

Expendable Property. Expendable supplies, other than ammunition, are obtained on requisition to the Post Property Officer concerned, the requisition bearing a certificate to the effect that the supplies requisitioned, added to those already drawn, do not exceed authorized allowances. Such property is dropped from accountability when issued, and the company commander is responsible only that the supplies drawn are used in accordance with regulations and orders in force at the time. Ammunition, though expendable, is carried on the stock record account of the regimental supply officer, and is on the company commander's memorandum receipt account. The company commander is relieved of responsibility, and the accountable officer of accountability for ammunition on a certificate of expenditure approved by the regimental commander. The certificate is prepared in triplicate; one for the accountable officer for use as a credit voucher, one for the local Ordnance Officer for use in preparing certain reports, and one for retention by the officer signing the certificate.

Unserviceable Property. Unserviceable property is classified, for purposes of disposition, as follows:

Class I. Property worn out or otherwise rendered unserviceable by fair wear and tear in the service, and property declared obsolete by competent authority.

Class II. Property rendered unserviceable by causes other than fair wear and tear in the service, or obsolescence.

Disposition of Unserviceable Property. Property of Class I may be placed on an I and I Report and submitted for the action of an inspector.

Property of Class II, except public animals, will be listed on Report of Survey. Public animals will be listed on a Report of Survey only when circumstances indicate that the animal's condition is the result of mistreatment or neglect on the part of some person. Otherwise, animals that die of sickness or that must be destroyed because of contagious disease or incurable injury, may be dropped from the property account of the accountable officer on the certificate of an officer, preferably a veterinary officer, stating the fact of destruction and the reason therefor. The accountable officer issues a credit to the responsible officer relieving him of further responsibility for such animals.

Report of Survey—When Required. A Report of Survey is required on any property of Class II as stated above, except when the individual responsible for the unserviceability agrees to pay for the article. Likewise, in case of loss or destruction of property, a survey is also required, except when the individual responsible agrees to accept a charge against his pay for the amount of the property.

Surveying Officer. A surveying officer will be appointed in every case in which the value of the property involved exceeds \$50, or in which the commanding officer does not approve the recommendation to relieve all concerned from responsibility. If the value of the property involved does not exceed \$50, and if in his judgment circumstances justify such action, the commanding officer may approve the report as submitted to relieve all concerned from responsibility for the loss or damage.

Clothing. Clothing for enlisted men is requisitioned, issued, and accounted for in a different manner than in the case of other property. The allowance for clothing is a money allowance.* That is, each man is credited upon enlistment with a certain money allowance, against which is charged the money value of articles necessary for his initial issue. He is also credited with a maintenance allowance for each six-month period of his enlistment, and any clothing drawn is charged against this money allowance. This is not a cash allowance, and soldiers do not buy their clothing. Clothing is issued, and is, therefore, not owned by the individual to whom issued. The soldier cannot sell it legally, throw it away, or otherwise dispose of it. This allowance is a credit only, though any amount not used at the time of discharge is normally paid to the soldier in cash. On the other hand, if the soldier has overdrawn his allowance at the time of settlement, the amount overdrawn is charged against him on the payroll.

The company commander is responsible that every soldier has sufficient clothing suitable to the climate and to the type of duty engaged in. He satisfies himself as to this by frequent inspections.

Clothing is normally drawn each quarter, except for individual issues to recruits upon enlistment. The clothing to be drawn for each man is listed on an *Individual Clothing Slip* (W. D., A. G. O. Form No. 35). In theory, this form is made out by each man for himself, but in actual practice some other system is used. Generally, the individuals notify the supply sergeant of their needs, and he makes out the form for them. From the *Individual Clothing Slips* is made out the *Requisition and Receipt for Clothing in Bulk* (Q. M. C. Form 409), which is submitted to regimental headquarters for approval, and then sent to the Quartermaster.

Upon receipt of the requisition, the Quartermaster immediately assembles the articles needed, and notifies the company commander when he is ready to issue them. The company commander, or an officer representing him, must be present to receive the clothing, to check the amount issued against the requisition, and to receipt for the issue. Clothing once issued to a company must be issued within 24 hours to the individual soldier or re-

*Money allowance for clothing has been discontinued for the period of the 1940-41 emergency.

turned to the Quartermaster for credit. The soldier acknowledges receipt of the clothing issued to him by signing the Individual Clothing Slip, which is also signed by the officer witnessing the issue.

Accounting for Clothing. The bulk requisition for clothing, with unit prices and totals entered, properly signed by the company commander or his commissioned representative and by the Quartermaster or his representative, must agree, of course, as to total quantities and to total value of clothing issued with the total amount accounted for on the Individual Clothing Slips. The clothing issued, together with the money value thereof, is entered on each soldier's *Individual Clothing Record*, the face of which shows the exact items issued, and the money value, together with the date of issue. The money value is also entered in the soldier's *Service Record*. Finally, there must be prepared a *Statement of Clothing Charged to Enlisted Men*, which lists the names of the men alphabetically, and shows the money value of the clothing issued to each. The total money value of clothing as entered on this form must agree with the total value of clothing drawn on the bulk requisition. The company commander's copy of the bulk requisition for clothing, together with the accompanying *Individual Clothing Slips* and the *Statement of Clothing Charged to Enlisted Men*, is filed with the company records.

Gratuitous issues of clothing are made under certain circumstances as, for example, especially arduous field service. The method of requisitioning, drawing, and issuing clothing under these circumstances is the same as outlined above. Clothing so issued is accounted for as stated above, except that the entry of the money value of the clothing on the Individual Clothing Slip, and the Service Record, is entered in a space provided for the purpose. The authority for the gratuitous issue is filed with the requisition.

MEDICAL PROPERTY AND SUPPLIES

Under the direction of the commanding officer a medical department officer is detailed as "supply officer" of the hospital and a noncommissioned officer as "supply sergeant."

General Supplies. General supplies are obtained by requisition on the local supply officers, i. e., quartermaster supplies are obtained from the station quartermaster, ordnance supplies from the station ordnance officer, etc. With the exception of the food supplies which are obtained by the mess officer, the supply officer of a small hospital has all supply functions including laundry. A general hospital, however, will usually have a quartermaster corps officer in addition to the medical supply officer.

Medical Supplies. Medical supplies are obtained by requisition on medical supply depots. Requisitions are classified as follows:

1. *Semiannual.* Items shown on these requisitions are the standard articles of medical and hospital supplies, except deteriorating items, included in the Medical Supply Table (AR 40-1710).
2. *Quarterly standard.* Items shown on these requisitions are the standard deteriorating supplies such as biological products.
3. *Quarterly nonstandard.* These requisitions provide for nonstandard supplies required during the quarter. The necessity for such articles must be shown on the requisition.
4. *Emergency.* These requisitions are submitted only when supplies are required for urgent needs.

It is also customary to allot medical department funds to each hospital for emergency local purchase of articles necessary to prevent suffering or distress among the sick and injured. Accounts for supplies so purchased are paid by designated disbursing officers on standard form vouchers. The latter are prepared by the local medical supply officer making the purchase.

The need for medical supplies must be anticipated; in this the supply table showing the normal allowances for hospitals of various sizes is used as a guide. Frequent emergency requisitions are usually the sign of a poor supply officer. They may be obviated in part by requiring the chiefs of services to keep the medical supply officer informed fully of their needs.

The medical supply officer is the "accountable officer" for all medical supplies issued to a hospital. All such supplies received are accounted for on stock record cards in the same manner as general supplies. These accounts are verified every six months. An annual report of medical supplies on hand is also required. When nonexpendable supplies and equipment are issued to a department or individual the medical supply officer takes the receipt of the officer responsible for the property. Expendable articles such as medicines, dressings, etc., when so issued are dropped as expended on the stock record card. Supplies are arranged in storerooms according to the supply table and issued at a regular time, daily or weekly. Alcohol, narcotics, and like supplies are secured and accounted for in the same manner as described under "Pharmacy management," Chapter VIII, Administration.

Ice for Hospitals. Ice for the preservation of food is furnished by the quartermaster as an article of issue. Ice for hospital purposes proper, i.e., that used for treatment of the sick, photography, etc., is purchased by the medical department and vouchered against the appropriation for medical and hospital supplies.

Laundry for Hospitals. The hospital laundry is done at the expense of the medical department in the following manner, varying according to the number of pieces:

1. By the hospital matron or by individuals who are engaged without advertising to do the work themselves (personal services).
2. By laundry firms engaged in open market when:
 - (a) Proposals were invited and none was received, or the bids were too high.
 - (b) When it is impractical to secure competition.
 - (c) Under public exigency.
 - (d) When the amount of laundry is so small that competitive bids can not be expected.

3. By formal contract executed in triplicate after advertising and the acceptance of bids.

4. By the post laundry at established rates:

Hospital laundry comprises: linen, clothing, and bedding of the medical department; washable clothing of patients in hospitals; white coats and trousers of enlisted men on duty in hospitals; and uniforms of nurses on duty.

Monthly vouchers for the payment of laundry accounts are prepared by the surgeon who certifies to the correctness of the account and that no articles of laundry were covered by the voucher which are not constituted by regulations as legitimate laundry of the hospital.

Medical Supply in the Field. The procedure in handling medical supplies in the field is the same in principle as for other classes of supplies. During combat the medical supply depots supply the medical units of the field armies, corps, and divisions. These medical units, through their respective headquarters and service companies or headquarters detachments, serve their respective subordinate units. For example: General supplies are handled by the headquarters and service company for the medical regiment only; however, medical supplies requisitioned from units other than the medical regiment are filled from the reserve stock upon approval of the division surgeon. For details as to medical supply in combat, see Employment of the Headquarters and Service Company of the Medical Regiment, Chapter II.

INDEX

- Abbreviated estimate of the situation, 781
- Abbreviations for military records, 829
- Abdomen, first aid for pain in, 499
- Accountability, definition of, 857
- Account of property on memorandum receipt, 858
- Accounting
 - for clothing, 863
 - mess, 845
- Active defense
 - conduct of the, 131
 - purpose of, 128
- Active duty
 - enactment for ordering personnel into, 34
 - for Reserve officers, 14
- Activities
 - Medical Department, 371
 - support of post, 314
- Adhesive plaster as bandage, 477
- Adjutant general, duties of, 159
- Administration, 801
- Administrative Division, SGO, 374
- Administrative orders, 783, 793
- Administrative Subdivision, SGO, 376
- Advance guard, 48, 111
- Advance party, 51
- Aerial photographs
 - uses of, 245
 - recognition of features on, 248
 - scales and azimuths, 251
 - terrain features and relief, 257
- Aerobiology, studies of, 514
- Aero Medical Association, 513, 514
- Agents
 - chemical warfare, 182, 521
 - contact, 632
- AGRAMONTE, ARISTIDES, 342
- Aid station
 - battalion, 350, 562
 - regimental, 565
- Aid Station Squad
 - functions of, 569
 - organization of, 540, 541, 545
 - veterinary, 574
- AINSWORTH, FRED C., 342
- Air attack, protection of marching columns against, 108
- Air base, definition of, 82
- Air Corps Primary Training Center, 517
- Air Corps, tactical functions of, 78
- Aircraft
 - chemical attacks from, 190
 - types of, 79
- Air officer, duties of, 156
- Air operations, types of, 79
- Air Service Manual*, 512
- Air Service Medical, 511
- Alarms, gas, 195
- Alcoholics, record of, 821
- ALGER, RUSSELL A., 340
- ALLISON, RICHARD, 331, 333
- Allotment of pay, 831
- Allowances
 - commutation of ration, patients in hospital, 851
 - hospital, 706
 - of Reserve officers, 15
- Ambulance battalion, 590
- Ambulance company
 - employment of, 637
 - organization of, 591
- Ambulance, first motor, 343
- Ambulance Service Corps, establishment of, 346
- Ambulance shuttle, 641
- Ambulance station, location of, 639
- Ambulance transportation, 498
- American Dental Association, 388
- American Medical Association, 389, 346
- American Red Cross, 340, 345, 735
- Ammunition
 - artillery, characteristics of, 64
 - supply of, 856
- Ammunition train, attached medical personnel with, 546
- Amoebic dysentery, 355, 366
- Animals
 - classification of sick and wounded, 575
 - losses of, form for, 799
 - protection against gas, 196
- Ankle hitch, 474
- "Anopheles Brigade", 342
- Antiaircraft artillery
 - in attack, 125
 - in pursuit, 127
 - tactical functions of, 75
- Antiaircraft defense, execution of, 136
- Antiaircraft officer, duties of, 156
- Antidotes for poisoning, 505
- Antimechanized defense, 58, 142
- Antitoxin, diphtheria, use of, 340
- Antityphoid immunization, 344
- Ants, control of, 437
- Apoplexy, first aid for, 500
- Appointments, requirements for
 - in Army Nurse Corps, 378
 - in Dental Corps, 377
 - in Medical Administrative Corps, 357, 378
 - in Medical Corps, 357, 376
 - in Officers' Reserve Corps, 13, 20
 - in Veterinary Corps, 378
- Approach march, 54
- Arm, fracture of the, 489
- Armored force
 - medical service with the, 666
 - organization of, 98
 - tactical functions of the, 83
- Arms carry, 493
- Arms, combined, tactical employment of, 103
- Arms
 - composition of the, 5
 - duties of chiefs of, 4
 - tactical functions of the, 37
- Arms, separate, missions appropriate to, during the attack, 124
 - during the defense, 131
 - in encircling maneuver, 126
 - protection of bivouac areas, 115
 - protection of marching columns, 113
- ARMSTRONG, HARRY G., 513, 519
- Army corps, organization of, 95
- Army Dental School, 354, 383
- Army Dispensary, 382, 383
- Army group surgeon, 700
- Army headquarters, medical section of, 675
- Army Medical Association, 336
- Army Medical Bulletin*, 357, 374

- Army Medical Bulletin No. 26*, 513
 Army Medical Center, 354, 380
 Army Medical Department professional schools, 383
 Army medical laboratory, 685
 Army Medical Library Centenary, 388
 Army Medical Library and Museum, 339, 358
 Army Medical Library, 335, 337, 367, 387
 Army Medical Museum, 337, 338, 358, 387, 388
 Army medical service, 674
 Army Medical School, 337, 339, 362, 383
Army Meteorological Register, 336
 Army and Navy General Hospital, 338
 Army Nurse Corps
 appointment and promotion, 378
 rights and privileges, 378
 Army Nurse Corps of the U. S. Army, 348
 Army, Regular
 mission, 8
 officers on duty as instructors, 8
 reasons for, 22
 Reserve, 9
 Army Regulations
 control of venereal diseases, 445
 first, 333
 use of, 837
 Army School of Nursing, 346, 348, 355
 Army Shoe Board, 344
 Army, strength of, 5
 Army surgeon, functions of, 674
 Army of the United States
 components of, 4
 creation of, 3
 expansion plans of 1940, 26
 field army organization, 7
 territorial organization, 7
 units of the, 6
 Army Veterinary School, 358, 383
 Army veterinary service, 685
 Artillery
 characteristics of, 63
 classification of, 64, 65
 direct support, 55
 employment, attached medical personnel with, 541, 548, 573
 Artillery officer, duties of, 156
 Artificial respiration, 501
 ASHBURN, P. M., 344, 355
 ASHFORD, BAILEY K., 342, 363
 Asphyxiation, first aid for, 500
 Assault, the, 55
 Assistant battalion surgeon, duties of, 551
 Assistant regimental surgeon, duties of, 551
 Assistant Secretary of War, duties of, 3
 Assistant Secretary of War (Air), duties of, 3
 Assistant squadron surgeon, duties of, 551
 Association of Military Surgeons, 338, 339
 Attached medical personnel
 with cavalry division, 548
 duties of commissioned personnel, 551
 employment with infantry, 553
 employment, units other than infantry, 572
 interior economy of, 550
 with infantry division, "square", 538
 with infantry division, "triangular", 546
 Attack
 cavalry in, 61
 conduct of the, 54, 124
 coordination in, 123
 infantry in, 52
 missions of arms and services in, 124
 objects of chemical, 187
 regimental medical detachment in, 567
 types of, 116
 zones of action, 55
 Attack aviation, 126
 Attendance, medical, provisions for, 803
 Augmentation plans, 23
 Automatic supply, 167, 728
 Auxiliary surgical group, 690
 Aviation, GHQ, 82, 93
 Aviation medical examiners, 359, 514
 Aviation medicine, 509
Aviation Medicine in the American Expeditionary Force, 512
 Axis of signal communication, 72
 Azimuths, direction and, 220
 Back-azimuth, 223
 Bacteriology, science of, 362
 Baffle traps, 411
 BAKER, NEWTON D., 25
 Ballistics, essentials of, 321
 Balloon flight, first, 509
 "Balloon sickness", 509
 Bandaging, 476
 BARNES, JOSEPH K., 331, 337
 BARON, FRANCIS L., 334
 Base of fire, 47
 Base reserves, definition of, 170
 Basic military training, 743, 750, 758
 Bathing facilities, 421
 Battalion
 ambulance, 590
 clearing, 593
 collecting, 587
 corps medical, 672
 infantry rifle, 40
 medical (armored), 612
 medical, employment of, 660
 medical, with infantry division, 605
 medical, provisional, 620
 Battalion aid stations, 350, 562
 Battalion supply officer, 854
 Battalion surgeon, duties of, 551
 Battery aid squad
 functions of, 573
 organization of, 541, 545
 Battle reserves, definition of, 170
 BAUER, LOUIS H., 512
 BAXTER, JEDEDIAH HYDE, 331, 338
 Beaten zone, 323
 BEAUMONT, WILLIAM, 335, 367
 Bedbugs, control of, 437
 Bed credits, 722
 Bed requirements for combat, 719
 BELL, MISS BESSIE S., 348
 Beriberi, 363
Bibliographia Medica, 388
 BILLINGS, FRANK, 347
 BILLINGS, JOHN SHAW, 337, 387, 388
 Bill of fare, 847
 Biological laboratories, 383
 Biological sources of diseases, 431
 Birth, child's, customs upon, 313
 Bivouacs, 109, 113, 140
 BLACKLEY, CHARLES H., 509
 Blisters, care of, 456
 Boiling of water, 400
 Bombs, 327
 Book Shop, Medical Field Service School, 353, 387

- Botulism, 417
- BRADLEY, A. E., 348
- Brain, first aid for injuries to, 499
- Bride, reception of a, 313
- Brigade, infantry, organization of, 41
- Brombenzylcyanide, effects of, 525
- BROWN, WILLIAM, 333
- Bubonic plague, 366
- Burns, first aid for, 504
- Bursting radius, definition of, 327
- Butter, inspection of, 421
- Cacolet, transport of patients by, 496
- Cadence drill, 745
- Cadre, definition of, 26
- Caduceus, designation as insignia, 336
- Calendar, inspection, 755
- Call, definition of, 167
- Camps
 - ambulance company in, 637
 - attached medical personnel in, 554
 - clearing company in, 644
 - collecting company in, 623, 664
 - convalescent, 713
 - embarkation-debarkation, 699
 - headquarters and service company in, 656
 - medical regiment in, 617
 - sanitation of, 396, 553
 - selection of sites for, 396
- Candles, chemical, cloud attacks with, 191
- Carbon monoxide, 527
- Carcasses, disposal of, 412
- Carlisle Barracks Military Reservation, 349, 353, 383
- Carlisle Indian Industrial School, 384
- "Carrier", transmission of diseases by a, 432
- CARROLL, JAMES, 342
- Car, scout, characteristics of, 85
- Casualties
 - battle, A.E.F., 327, 707
 - battle, estimation of, 556
 - battle, Spanish-American War, 341
 - evacuation of, 174
 - gas, first aid for, 528
 - march, 554
 - march collection of, 620
- Cavalry
 - missions of, 113, 116, 124, 127, 131
 - medical detachment with, 548, 576
 - tactical functions of, 58
- Cavalry division
 - medical service within the, 663
 - organization of, 98
- Central Dental laboratories, 357
- Central Hospital Fund, 340
- Central Medical Research Laboratory, 511
- CHAMBERLAIN, W. P., 347
- Chancroid, transmission of, 442
- Chaplain, duties of, 159, 320
- Chemical officer, duties of, 157
- Chemical prophylaxis, 444
- Chemical warfare
 - defense against, 181
 - definitions of, 181
 - medical aspects of, 521
- Chemical Warfare Service, 182
- Chief Clerk, SGO, 374
- Chiefs of arms and services, duties of, 4
- Chief of staff, 3, 151
- Chief Surgeon of the Air Service, 347
- Chief Surgeon, Aviation Section, Signal Corps, 512
- Chief Surgeon's Office, 347
- Chief Surgeon's Office, general headquarters, 690
- Chloracetophenone, effects of, 526
- Chlorination of water, 402
- Chlorine, effects of, 522
- Chlorine and orthotolidine, reaction between, 402
- Chlorpicrin, effects of, 522
- Choking, first aid for, 503
- Christmas, ceremonies at, 314
- CHURCH, BENJAMIN, 331
- Circle, azimuth, 222
- Civilian Conservation Corps
 - medical service for, 356
 - strength of, 357
 - supply of pneumococcus vaccine to, 362
 - typhoid fever in, 361
- Civilian employees, sales of medicines to, 821
- Civilian medical attendance, 803
- Civilian Personnel Subdivision, SGO, 375
- Civil medical practice, 803
- Claims, Subdivision, SGO, 375
- Class I supplies, 855
- Classes of Medical Department personnel, 724
- Clavicle, fracture of the, 488
- Cleaning devices, 421
- Clearing battalion, 593
- Clearing company
 - employment of, 643, 661, 667
 - organization of, 593, 611, 612a
- Clearing station
 - definition of, 170
 - location and establishment of, 645
 - moving the, 653
 - operation of, 648
- Clearing troop
 - employment of, 665
 - organization of, 601
- Clinical record, 818
- Clothing
 - care of, 453
 - protective, 194
 - supply of, 862
- Club, officers', 314
- Coach-and-pupil method of training, 744
- Coast artillery corps, tactical functions of, 74
- Coast artillery regiments, medical detachments with, 578, 579, 580
- COCHRAN, JOHN, 331
- Code, officers', 310
- Collecting battalion, organization of, 587
- Collecting company
 - employment of, 623, 666
 - organization of, 589, 609, 612
- Collecting station
 - definition of, 170
 - displacement of, 635
 - location and establishment of, 626
 - operation of, 629
 - relief of companies at, 635
- Collecting troop, organization of, 600
- Colles' fracture, 489
- Color-blindness, 510
- Colors
 - courtesies to, 305
 - presentation of recruits to, 313
- Column combat teams, definition of, 106

- Combat
 - antiaircraft defense in, 141
 - defensive, combined arms in, 127
 - infantry, basic factors of, 46
 - offensive, 116
- Combat orders, 782
- Combat team, composition of, 41, 67
- Combat value of units, 175
- Combat zone, definition of, 167
- Combined, arms, tactical employment of, 103
- Commander
 - company, duties of, 860
 - force, action during attack, 125
 - hospital, duties of, 811
- Command and staff procedure; 147
- Commissioned Subdivision, SGO, 375
- Communication
 - infantry regiment, 46
 - medical units, 72
 - regimental medical detachment, 566
- Communications zone
 - definition of, 167
 - hospital units of the, 709
 - office of the surgeon, 691
- Commutation of ration, allowances, 851
- Communicable diseases, 429
- Company aid posts, 570
- Company aid squad
 - functions of, 558, 567, 570
 - organization of, 540
- Company aid station, World War, 350
- Company supply officer, 860, 864
- Compass, use of, 235
- Components, Army of the United States, 4
- Composting, disposal of manure by, 407
- Concealment of patrols, 90
- Concentration area, definition of, 26
- Concentration center, Medical Department, 691
- Concussion of the brain, first aid for, 499
- Condensed milk, inspection of, 421
- Conduct of attack, 124
- "Contact," transmission of diseases by a, 431
- Conscription, history of, 24
- Constipation, causes of, 449
- Constitution of the United States
 - provisions for declaring war, 21
 - relating to national defense, 2
- Contours, map, 226
- Contract surgeons, 379
- Control of communicable diseases, 434
- Control point, definition of, 169
- Contused wounds, 480
- Convalescent camps, 713
- Convalescent hospitals, 682
- Convoy-movements, 292
- Cooking, 843
- Cooks, duties of, 839
- Coordinate card, 216
- Coordinated attack, 116
- Coordinates
 - location by grid, 215
 - location by polar, 214
- Coordinating line, definition of, 106
- Coordination in attack, 123
- Coordinating point, definition of, 106
- "Cootees," control of, 437
- Corps areas, division of U.S. into, 7
- Corps Area Service Command, definition of, 26
- Corps Area Surgeon, 371
- Corps medical park, 732
- Corps medical service, 669
- Correspondence book, 835
- Correspondence, military, 833
- Cost Accounting Subdivision, SGO, 375
- Council, General, duties of, 4
- Counterreconnaissance, cavalry, 60
- Courtesy, military, 299
- Courts-martial, conduct of witness at, 303
- Covering forces, purpose of, 134
- Covering shell, purpose of, 133
- "Crabs," control of, 437
- CRANE, CHARLES HENRY, 331
- CRAIK, JAMES, 331, 333
- Credit, definition of, 167
- Credits, bed, 722
- Cross-country march, definition of, 105
- Customs of the service, 309
- Cylinders, chemical, cloud attacks with, 191
- Daily losses of animals, form for, 799
- Daily losses of personnel, form for, 798
- Daily sick report, 804
- Daily stock record, 846
- Daily telegram, definition of, 167
- Daily train, definition of, 169
- Dairy products, inspection of, 419
- Danger space, 323
- Danger zone, 325
- DARNALL, C. R., 344, 360, 401
- Data, medical reference, 793
- Day of fire, definition of, 169
- Day of supply, definition of, 167
- Deaths
 - customs in connection with, 313
 - in military hospitals, 821
- Decision, the, 177
- Declaration of war, 21
- Declination on maps, 224
- Defense
 - against chemical warfare, 181
 - antimechanized, 58
 - cavalry in, 61
 - combined arms in, 127
 - infantry in, 56
 - regimental medical detachment in, 570
- Defilade, 325
- Definitions,
 - hospitalization and evacuation, 705
 - march terms, 105
 - mobilization terms, 26
 - supply terms, 167, 857
- Degassing and decontamination, 195
- Dengue fever, 364
- Delaying action
 - cavalry in, 60
 - combined arms in, 135
- Dental administration, 822
- Dental Corps
 - appointment and promotion in, 377
 - duties of officers of, 551
 - establishment of, 344
 - origin of, 341
 - reorganization of, 345
 - study of heart disease by, 366
- Dental Division, SGO, 376
- Dental hygiene, 450
- Dental reports, 822
- Department hospitals, administration of, 809
- Department surgeons, 371
- Depots
 - administration of, 730
 - classification of, 169

- definition of, 169
- medical supply, 683
- Depth, infantry battalion in defense, 56
- Deputy chief of staff, 3, 151
- Designation of infantry units, 41
- Detachments, medical; *see* Attached medical personnel
- Detention camp, 440
- Diary, 837
- Diet cards, 818
- Diet chart, 840
- Diets, 448, 449, 850
- Digestion, physiology of, 367
- Dining room orderly, 840
- Dinners, ceremonies at holiday, 314
- Diphenylaminechlorarsine, 526
- Diphenylchlorarsine, 526
- Diphosgene, effects of, 522
- Discharge for disability, 820
- Dispensary, general, communications zone, 694
- Diphtheria antitoxin, use of, 340
- Direction and azimuths, 220
- Discipline
 - camouflage, 87
 - gas, 194
 - importance of, 176
 - march, 108
 - morale and, 1
 - water, 394
- Diseases
 - communicable, 429
 - transmission of, by food, 417
 - venereal, 440
- Disinfection, process of, 436
- Disinfesting, process of, 436
- Dislocation, treatment of, 491
- Dispensary, army, administration of, 811
- Dispersion, 323
- Disposal of wastes, 403
- Distortion on aerial photographs, 247
- Distance
 - ground, determining, 235
 - map, determining, 217
- Distillation of water, 400
- Distributing point, definition of, 169
- Division, armored medical service with the, 666
- Division, cavalry
 - medical detachments with, 548, 576
 - medical service within, 663
- Division, infantry
 - medical detachments with, 538, 546
 - medical service within, 614
 - National Guard, 10
 - organization of, 97
 - supply system in, 171
 - surgeon's office, 580
- Division special troops, attached medical personnel with, 546, 549
- Division of Vital Statistics, SGO, 374
- Document file, 835
- Dodge Commission, 341
- Dog bites, treatment of, 482
- Draft, definition of, 167
- Draft proclamation, President's, 33
- Dressing station, World War, 351
- Drill, cadence, 745
- Drinking during marches, 108
- Drivers, training of, 282
- "Droplet infection," 457
- Drowning, first aid for, 502
- Dump, definition of, 169
- DUNHAM, GEORGE C., 355
- Duties
 - attached medical personnel, 551
 - flight surgeon, 514
 - hospital commanders, 811
 - medical officers on marches, 395
 - registrar, 812
 - training, distribution of, 741
- Duty roster, 830
- Dysentery, control of, 366
- Ears
 - care of the, 458
 - removal of foreign bodies from, 507
- Eating during marches, 108
- Echelonnement of medical depots, 731
- Echelons, classification of field medical service by, 670
- Eggs, inspection of, 418
- Elevation on maps, 226
- Embarkation-debarkation camp, surgeon of, 699
- Emergency evacuation stations, 676
- Emergency medical tag, 558
- Emetics, 506
- Engineer officer, duties of, 157
- Engineer regiment, medical detachment with, 545
- Engineer squadron, medical detachment with, 549
- Engineer supplies, 856
- Engineers
 - missions of, 113, 116, 125, 127, 132
 - tactical functions of, 69
- Enlisted Subdivision, SGO, 375
- Envelopment, attack by, 117
- Epileptic convulsions, first aid for, 500
- Equilibrium, tests for, 510
- Equipment, display of, 756, 757
- Estimate of the situation, 178, 778
- Evacuation
 - in communications zone, 723
 - definition of, 170, 706
 - of gas patients, 532
 - hospital, definition of, 170
 - infantry regiment, 46
 - of large units, 165
 - means and policy of, 720
 - principles of, 613
 - requirements for, 796
 - secondary, 723
 - stations, emergency, 676
- Examinations, recruiting and physical, 804
- Excreta, disposal of, 404
- Executive officer, SGO, 374
- Exercise, physical, 459
- Expansion plans, Army of the United States, 26
- Expendable property, 857, 861
- Eyes
 - care of the, 458
 - removal of foreign body from, 507
- Fainting, first aid for, 499
- FAIRBANK, LEIGH C., 357
- Feet, care of the, 453
- Field army organization, 7, 93
- Field artillery
 - missions, 113, 116, 125, 127, 131
 - tactical functions of, 61
- Field of fire, definition of, 47

- Field forces
 - medical service of, 689
 - organization of, 93
- Field hospital, World War, 351
- Field medical record, 654
- Field message book, 74
- Field operation, training of medical units for, 758
- Field orders, 782, 785, 795
- Field ration, 841
- Field sanitation, 391
- Field Service and Correspondence School of Medical Officers, 344
- Filler replacement, definition of, 26
- Filter traps, 411
- Finance officer, duties of, 160
- Finance Subdivision, SGO, 375
- Finance and Supply Division, SGO, 375
- FINLEY, CLEMENT ALEXANDER, 331
- Fire, artillery
 - control of, 63
 - effects of, 327
- Fire, rifle, effects of, 327
- Fireman's carry, 493
- Fire and movement, infantry, 46
- Fire superiority, 327
- First aid, 463
- 1st Medical Regiment, 357, 358
- Fish, inspection of, 418
- FITZSIMONS, WILLIAM T., 347
- Fixed hospitals, administration of, 811
- Flag
 - courtesies to the, 305
 - display and use of, 305
- Flank guards, 51, 111
- Flat-tops, description of, 87
- Fleas, control of, 437
- Flies, control of, 415, 436
- Flight surgeon, 359, 514
- Flight Surgeon Topics*, 513
- Flying Cadet Examining Boards, 514
- Food
 - functions of, 840
 - handling of, 414
 - inspection of, 416
 - procurement and storage of, 842
 - protection against gas, 196
- Foot rest, Army leg splint, 471
- Forearm, fracture of the, 489
- Forced march, definition of, 105
- Formations, patrol, 90
- Form of attack, choice of, 119
- FORWOOD, WILLIAM HENRY, 331
- FOSTER, GEORGE P., 345
- Fraction, representative, 218
- Fractures, types and treatment of, 486
- Freezing, first aid for, 504
- Frei intra-cutaneous test, 442
- Frontage, infantry battalion, 55, 56
- Fumigation, process of, 436
- Funerals, military, 303, 316
- Fund, hospital, 851
- Garbage, disposal of, 409
- Garrison ration, 841
- Garrison, supply in, 857
- GARRISON, WILLIAM LLOYD, 336
- Gas
 - chemical, definition of, 182
 - defense training, 182
 - tactical use of, 187
 - toxic, treaty prohibitions of, 182
- Gasoline, replenishment of, 171
- General Council, duties of, 4
- General dispensary, communication zone, 694
- General hospitals, administration of, 809
- General Service Personnel, definition of, 26
- General staff, duties of, 4, 150
- Genito-urinary system, hygiene of the, 460
- Geographical sources of diseases, 431
- GILCHRIST, HARRY L., 355
- GLENNAN, JAMES D., 347
- Gonorrhea, transmission of, 442
- GORGAS, WILLIAM CRAWFORD, 331, 342, 345, 360
- Grease traps, 411
- Grenades, chemical, use of, 191
- Grid azimuths, 224
- Grid coordinates, location by, 214
- Grid declination, 224
- Grid-magnetic azimuth adjustment, 225
- Grid square, location by, 215
- GROW, MALCOLM C., 513, 519
- Guides, training, 755
- Gunshot wounds, 480
- Hair, care of the, 452
- Halts during marches, 108
- HAMMOND, WILLIAM A., 336
- Hand, fracture of the, 489
- HAWLEY, PAUL R., 358
- Headress, removal of, 303
- Headquarters, commandant, duties of, 158
- Headquarters detachment, medical squadron, 599
- Headquarters and service company
 - organization of, 585
 - employment of, 656
- Health
 - measures to maintain, 438
 - relation between weight and, 460
- Heat exhaustion, first aid for, 503
- Heating of buildings, 435
- HEIM, J. W., 513
- Hemorrhage, types and control of, 483
- HENDERSON, VANDELL, 511
- History of the Medical Department of the United States Army*, 355
- History, medico-military
 - evolution of Medical Dept., U.S. Army, 331
 - era of central organization, 334
 - era prior to central organization, 332
 - "with due respects to Army medicine," 359
- History of service, 837
- HOFF, VAN R., 365
- Hoff Hall, 359
- Holding attack, 121
- Hookworm, eradication of, 363
- Horseback, transport of patients by, 495
- Hospital centers, 710
- Hospital Corps, 337, 338, 340, 341
- Hospital fund, 851
- Hospitalization
 - definition of, 714
 - fixed, distribution of, 714
 - program, development of, 716
- Hospital messes, 850
- Hospitals
 - administration of, 809
 - convalescent, 682
 - division, 340
 - evacuation, 677
 - regimental, discontinuance of, 340

- station, 713
- surgical, 677
- veterinary, 696
- Hospital steward, 342
- Hospital Subdivision, SGO, 375
- Hospital train, definition of, 170
- Hour of arrival, definition of, 106
- Hour of clearance, definition of, 106
- Housing sanitation, 436
- HUME, EDGAR ERSKINE, 352
- HUNTINGDON, GEORGE S., 358, 389
- Hydrocyanic acid, 526
- Hygiene, military, 447
- Ice for hospitals, 864
- Immunity to diseases, 432
- Immunization, 807
- Inactive Reserve, 379
- Incendiaries, 183, 527
- Incinerator, cross trench, 408
- Incised wounds, 480
- Index, Army Regulations, 837
- Index-Catalogue*, 388
- Index Catalogue Subdivision, SGO, 376
- Index Medicus*, 338, 354, 355, 388
- Individual reserves, definition of, 171
- Indoors, definition of, 301
- Induction, definition of, 26
- Infantry
 - employment, attached medical personnel with, 551
 - missions of, 113, 116, 124, 127, 131
 - organization of, 38
 - tactical functions of, 37
- Infantry divisions
 - medical detachments with, 538, 546
 - medical service within, 614
 - organization of, 97, 98
- Infected wounds, 481
- Initial military program, 23
- Initial point, definition of, 106
- Initial Protective Force, 23
- Initial supply, 728
- Insane, care and disposition of, 820
- Insect control, 436
- Inspection calendar, 755
- Inspections
 - by hospital commander, 812
 - of messes, 415
 - of motor vehicles, 282
- Inspector general, duties of, 160
- Instructor, Regular Army, 8, 11, 16, 19
- Instruction, steps of, 745
- Intelligence, chemical, 198
- Interior economy, attached medical personnel, 550
- Internships in Army hospitals, 357
- Intersection, location of points by, 223
- Intoxication, first aid for, 503
- Inventory and inspection report, 858
- Iodine, use for purification of water, 403
- IRELAND, MERRITTE WEBER, 331, 348, 349, 353, 355, 380
- Irritant gases and smokes, 521, 526
- Isolation of infected persons, 439
- JONES, ISAAC, 511
- JONES, JOHN, 332
- Judge advocate, duties of, 160
- Journal of the American Medical Association*, 355
- Journal of Aviation Medicine*, 513
- Journals, staff, 161
- KEAN, J. R., 342
- KELSER, RAYMOND A., 354, 364
- Laboratory, army medical, 685
- Lacerated wounds, 480
- Lacrimators, 183, 525
- Larynx, removal of foreign body from, 507
- Latrine, pit, 404
- Laundry facilities, 421, 864
- LAWSON, THOMAS, 331, 335
- LAZEAR, JESSE W., 342
- Leadership, 1, 175
- Leg, fracture of the, 491
- Leg splint, application of, 464
- Lengths of marches, 104
- Letterman General Hospital, 341, 344
- LETTERMAN, JONATHAN, 344
- "Letterman Plan," 337
- Letters of instruction, 782
- LEWIS, EUGENE R., 511
- Lewisite, effects of, 524
- Liaison between units, 163
- Liaison officers, duties of, 163
- Library Division, SGO, 376
- Library Service Subdivision, SGO, 376
- Library of the Surgeon General's Office, 335, 337
- Lice, control of, 437
- Lighting of buildings, 436
- Limited Service Personnel, definition of, 26
- LINDBERGH, CHARLES A., 513
- Lines of communication, definition of, 169
- Liquid wastes, disposal of, 410
- Litter bearer squad
 - functions of, 561, 568, 571, 573
 - organization of, 540, 541, 545
- Litter, transport by, 495
- Load, the soldier's, 392
- Location by maps, 214, 241
- Losses of animals, form for, 799
- Losses of personnel, form for, 798
- Loss replacement, definition of, 26
- LOVELL, JOSEPH, 331, 334, 387
- Lubrication of motor vehicles, 277
- Lung irritants, 183, 221
- LYSTER, THEODORE C., 347, 511
- Lymphogranuloma inguinale, 442
- MCCAW, WALTER D., 349
- MAGEE, JAMES CARRE, 331, 356, 359
- McHENRY, JAMES, 333
- McKINLEY, E. B., 514
- Magnetic azimuth, 224
- Magnetic declination, 224
- Main attack, 123
- Maintenance of motor vehicles, 280
- Maintenance supply, 728
- Malaria, control of, 366
- Maltese cross, 339, 342
- "Manchu" provision, 344
- Manual transport, 492
- Manure, disposal of, 407
- Map reading, 201
- Maps, military, 161, 201, 792
- March collecting posts, 624
- Marches
 - division of, 103
 - antiaircraft defense during, 138
 - sanitation on, 392
- Marching columns, protection of, 113
- Marching by compass, 240
- March outpost, 51

- March, order of, medical regiment, 621
 March unit, definition of, 105
 Marginal information on maps, 213
 Maroon (color), adoption of, 342
 MARSHALL, GEORGE C., 1
 MARTIN, ALEXIS ST., 367
 Mask, gas, 193
 Master schedule, 753
 MAUS, LOUIS M., 365
 MAYO, WILLIAM J., 347
 Measuring distance on maps, 217
 Meat products, inspection of, 416, 417
 Mechanical inspection report, 282
 Mechanized vehicles, description of, 85
 Medical Administrative Corps, 346, 353, 357, 378
 Medical attendance, provisions for, 803
 Medical Corps
 designation of, 343
 promotion of officers in, 376
 selection of officers for, 376
 Medical Department
 A.E.F., 347
 classification of noncommissioned officers, 359
 mobilization training program, 757
 organization and activities of, 371
 personnel, classes and distribution of, 724
 Medical Department Board, 387
 Medical Department concentration center, 691
 Medical Department Equipment Laboratory, 353, 387
 Medical Department Research Coordinating Board, 359, 362
 Medical depots, 730
 Medical detachments; *see* Attached medical personnel
 Medical examining unit, aviation, 695
 Medical Field Service School, 353, 358, 359, 383
 Medical headquarters, GHQ, 691
Medical Instructors Bulletin, 356, 357
 Medical officer of the day, 811
 Medical plan, 777
 Medical reference data, 793
 Medical Research Board, 511, 512
 Medical Research Laboratory, 511
 Medical Research Laboratory and School for Flight Surgeons, 352, 353, 512
 Medical Reserve Corps, 343, 356
 Medical Reserve Officers' Training Corps, 356
Medical Service in Campaign, 344
 Medical supply, 727, 856, 863
Medical and Surgical History of the War of the Rebellion, 337
 Medical units
 administration of, 825
 ROTC, 17
 standing operating procedures for, 146
 training of, 741
 Medicine
 aviation, 509
 essentials of military preventive, 429
 Medicine and Surgery Subdivision, SGO, 374
Medicine, Its Contribution to Civilization, 355
 Medico-military history; *see* History
 Medico-military man, the, 368
 Meeting engagement, attack in a, 117
 MEIER, F. C., 513, 514
 Memorandum receipt, use of, 858
 Mess accounting, 845
 Message center, definition of, 72
 Messages
 definition and classification of, 73
 preparation of, 73
 Messengers and messenger service, 72
 Messes
 hospital, 850
 field, sanitation of, 413
 Mess kits, cleaning, 414
 Mess management, 839
 Mess officer, duties of, 839
 Mess, officers', 314
 Mess, seating at, 311
 Mess sergeant, duties of, 839
 Meteorological report, first, 335
 Military intelligence (G-2) section, duties of, 152
Military Preventive Medicine, 355
Military Surgeon, 338
 Military Surgeons of the United States, 514
 Milk, inspection of, 419
 Mil, the, 224
 Mimeograph and Circulation Subdivision, SGO, 374
 Mines
 antitank, use of, 143
 chemical, use of, 191
 Mission
 effect on decision, 119
 medical, 777
 National Guard, 9
 Regular Army, 8
 scouts and patrols, 90
 Mites, control of, 437
 Mobilization, defined, 21
 Mobilization planning
 definitions of terms, 26
 responsibility for, 22
 Mobilization point, definition of, 26
 Mobilization policy of the United States, 22
 Mobilization time (M-day), definition of, 26
 Mobilization training program, 758
 Monthly mess account, 848
 MOORE, JOHN, 331
 Morale, 1
 Morale and unity, 176
 MORGAN, JOHN, 331, 332
 Morning reports, 826
 MORRISON, JOHN S., 344
 Mortar, chemical, 189
 Mosquitoes, control of, 436
 Motorized vehicles, description of, 85
 Motor transport, troop movement by, 104
 Motor vehicles; *see* Vehicle, motor
 Mouth, care of the, 450
 Movement orders, 783
 Movement of patrols, 90
 MUNSON, EDWARD L., 344
 "Munson Last," 344
 MURLIN, JOHN L., 348
 MURRAY, ROBERT, 331
 Mustard, effects of, 522
 MYER, ALBERT J., 337
 MYERS, DAVID A., 512
 Nails, care of the, 453
 Narcotics, record of, 821
 National anthem, courtesies to the, 305
 National Defense Act, 2, 345
 National Guard
 active duty for, 34
 Bureau, 11
 definition, 10

- instructors, 11
- mission, 9
- organization of medical units, 342
- strength and organization, 10
- National Red Cross, 344
- National Research Council, 389
- New Year's calls, 311
- Night march, definition of, 105
- NOBLE, ROBERT E., 347
- Noneffective rate, definition of, 427
- Nonexpendable property, definition of, 857
- Nonpersistent gas, definition of, 183
- Nontactical march, definition of, 105
- Nose, removal of foreign body from, 507
- Nurse Corps, 341, 342, 346, 348
- Nursing Division, SGO, 376
- Nutrition, 447
- O'REILLY, ROBERT MAITLAND, 331
- Observation aviation, missions of, 113, 115, 124, 126, 131
- Obstacles, use of, 143
- OCKER, WILLIAM C., 512
- Offensive combat, combined arms in, 116
- Office Equipment Subdivision, SGO, 374
- Office Management Subdivision, SGO, 374
- Office of record, 161
- Office of the Surgeon General, 372
- Office of the surgeon, communications zone, 691
- Officer candidate, definition of, 26
- Officer in charge of civil affairs, duties of, 160
- Officer of the day, medical, 811
- Officers
 - appointment of Medical Administrative Corps, 357
 - appointment of Medical Corps, 357
 - line, cooperation with medical officers, 392
 - Regular Army, instructors, 8, 11, 16, 19
- Officers' code, 310
- Officers' control station, definition of, 170
- Officers' Reserve Corps, 12, 379
- Official History of War, Medical Service, Diseases of the War*, 524
- Oil, replenishment of, 171
- Operating rooms, origin of, 339
- Operation map, 792
- Operations, theatre of, 689
- Operations and training (G-3) section, duties of, 152
- Order of march, definition of, 106
- Orders
 - administrative, 793
 - combat, 782
 - company, 836
 - field, 785
 - requirements for, 177
 - sanitary, 425
- Ordnance officer, duties of, 158
- Organized Reserves
 - active duty for, 34
 - Officers' Reserve Corps, 12
 - organization and purpose, 11
 - Regular Army personnel with, 16
- Orienting the map in the field, 240
- Orientation
 - aerial photographs, 248
 - in the field, 240
- Orthotolidine and chlorine, reaction between, 402
- Out of doors, definition of, 301
- Outposts, 51
- Outpost line of resistance, 58
- Over, short, and damaged report, use of, 858
- Packet, first aid, 479
- Panama Canal, 360
- Papers, disposal of, 412
- Paralysants, 526
- Passive defense
 - conduct of, 130
 - purpose of, 128
- Pasteurization of milk, 420
- Patients
 - commutation of ration allowances for, 851
 - disposition of, 819
 - property of, 818
- Patrolling, scouting and, technique of, 89
- PATTERSON, ROBERT URIE, 331, 353
- Pay
 - allotment of, 831
 - of patients, 819
 - of Reserve Officers, 15
- Pay roll
 - model, 832
 - preparation of, 833
- Pay table, conduct of men at, 303
- Pelvis, fracture of the, 491
- Penalty envelopes, use of, 836
- Penetration, attack by, 116
- Persistent gas, definition of, 183
- Personnel (G-1) section, duties of, 151
- Personnel Division, SGO, 375
- Personnel
 - losses of, form for, 798
 - Medical Department, classes and distribution of, 724
 - medical service of a field force, 689
- Pharmacopeia, earliest, 333
- Pharmacy management, 821
- Pharmacy supplies, 821
- Phosgene, effects of, 521
- Photo-coordinate card, 250
- Photographs, aerial; *see* Aerial photographs
- Physical examinations, 804
- Physical exercise, 459
- Physiological research laboratory, 357, 513, 519
- Piecemeal attack, 116
- Plans
 - of attack, 121
 - medical, 777
 - requirements for, 177
 - training, 748
 - unit, 781
- Planning Subdivision, SGO, 375
- Planning and Training Division, SGO, 374
- Platoon
 - infantry rifle, 38
 - litter bearer, 633
- Pneumonia, study of, 362
- Point of the advance guard, 51
- Poisoned wounds, 481
- Poisoning, first aid for, 505
- Polar coordinates, location by, 214
- Polish Typhus Relief Expedition, 352
- POLK, JAMES K., 336
- Positions
 - artillery firing, 66
 - organization of the, 130
 - selection of defensive, 128
- Postage (use of penalty envelopes), 836
- Post property officers, 857
- Posts, march collecting, 624
- Posture, correct, 459
- Poultry, inspection of, 418

- Prescription, files, 821
- President
 draft proclamation of, 33
 duties of, 3
- Preventive medicine, essentials of military, 429
- Preventive Medicine Subdivision, SGO, 374
- Priorities, definition of, 167
- Prisoner of war collecting points, 170
- Processing, definition of, 26
- Procurement of food, 842
- Procurement Planning Subdivision, SGO, 375
- Professional Service Division, SGO, 374
- Profiles, use of, 229
- Programs, training, 748
- Projectiles, 325
- Projector, chemical, 189
- Promotion
 Medical Department Officers, 376, 377, 378
 Reserve officers, 13
- Prophylaxis
 Army Regulations on, 446
 specific, 439
- Prostitution, control of, 443
- Protective Mobilization Plan (PMP), 23
- Protractor, map reading, 222
- Provisional medical battalion, 620
- Provost marshal, duties of, 158
- Pulmonary edema cases, 532
- Punctured wounds, 480
- Purification of water, 400, 403
- Pursuit
 cavalry in, 61
 tactical employment, combined arms in, 126
- Pyorrhea alveolaris, 451
- Quarantine of infected persons, 439
- Quarterly Cumulative Index, 354
- Quartermaster, duties of, 160
- Quartermaster corps
 supply to security detachments, 113
 supply to bivouac areas, 116
 supply in attack, 125
- Quartermaster regiment, attached medical personnel with, 545
- Railhead, definition of, 169
- "Rank has its privileges" (RHIP), 311
- Rates of marches, 104
- Rations, kinds of, 841
- Rear guards, 51, 111
- Reappointment of Reserve officers, 13
- Reception center, definition of, 26
- Reception of newly joined officers, 312
- Record and Mail Subdivision, SGO, 374
- Reconnaissance
 cavalry, 60
 chemical, 198
 of medical officers, 555
 route, 107
- Records, physical examination, 806
- Recruiting examinations, 804
- Recruits
 presentation to colors, 313
 training of, 743
- REED, WALTER, 341, 342, 360, 382
- Reference data, medical, 793
- Refrigerators, use of, 417
- Regiment, medical
 army, 617, 676
 with infantry division, "square," 581
- Regimental aid stations, 565
- Regimental medical detachment
 with artillery regiment, 541, 573
 with cavalry regiment, 548, 576
 with engineer regiment, combat, 545
 with infantry regiment, 538, 553
 organization and functions, 537
- Regimental reserve line, 56
- Regimental supply officer, 854, 859
- Regimental surgeon, 551
- Registrar, duties of, 812
- Regular Army; *see* Army, Regular
- Regulating officer, 721
- Regulating stations, 129, 721, 732
- Regulations, Medical Dept., first, 334
- Reinforcing units, organizations of, 101
- Relations
 commander with his troops, 176
 general and special staffs, 614
 officer-soldier, 310
 staff, 701
 staff with subordinate units, 155
- Relief
 from assignment, customs upon, 314
 from responsibility, 861
- Relief
 on aerial photographs, 257
 on maps, 226
- "Relief," Hospital Ship, 340
- Replacement, definition of, 26
- Replacement center, definition of, 26
- Report, sanitary, 422
- Report of physical examination, 807
- Report of survey, 858, 862
- Reports Subdivision, SGO, 374
- Representative fraction, 218
- Requisition, 167, 858
- Research laboratory for aviation medicine, 348
- Resection, location of points by, 223
- Reserve, GHQ, composition of, 93
- Reserve, Regular Army, 9
- Reserve of the advance guard, 51
- Reserve Officers Association, 16
- Reserve Officers' Training Corps, 15, 380
- Reserves, medical regiment, 622
- Reserves, Organized; *see* Organized Reserves
- Reserve Subdivision, SGO, 375
- Reserve supply, 170, 728
- Resistance to diseases, 432
- Respiratory apparatus, hygiene of the, 457
- Respiratory diseases, factors in control of, 434
- Responsibility
 acceptance of, 176
 for applying hygienic measures, 447
 definition of, 857
 education of men in sex hygiene, 445
 for venereal control, 441
- Retired personnel, enactment for ordering personnel into active duty, 34
- Retirement, combined arms in, 136
- Retrograde movements, regimental medical detachments in, 571
- REYNOLDS, CHARLES RANSOM, 331, 358
- Ribs, fracture of the, 489
- Rinderpest, 354, 364
- Road space, definition of, 105
- Roaches, control of, 437
- Rodents, control of, 438
- Roller bandage, 477
- ROLLESTON, HUMPHREY DAVY, 357
- "Rolling" reserves, definition of, 171
- ROOSEVELT, THEODORE, 343

- Routes of patrols, 90
- Routine orders, 782
- Rubbish, disposal of, 412
- Rules
 - for bandaging, 479
 - of first aid, 474
 - first aid treatment of wounds, 482
 - ward, 818
- RUSH, BENJAMIN, 332
- RUSSELL, F. F., 343, 361
- Saddle-back carry, 495
- Salute
 - cannon, at funerals, 319
 - hand, 299
- Sanitary Corps, 346, 348
- Sanitary order, 425
- Sanitary reports, origin of, 338
- Sanitary survey and report, 422
- Sanitation
 - field, 391
 - in mess operations, 845
 - in theatre of operations, 735
- Scalds, first aid for, 504
- Scales
 - aerial photograph, 251
 - graphic, 219
 - time-distance, 220
 - words and figure, 219
- Schafer method, artificial respiration, 501
- Schedules, training, 748
- SCHEPPEGREL, WILLIAM, 512
- School of Aviation Medicine, 354, 355, 356, 512, 513, 516
- Scout car, characteristics of, 85
- Scouting and patrolling, technique of, 89
- Seacoast artillery, tactical functions of, 75
- Sea foods, inspection of, 418
- Seating at mess, 311
- Secondary evacuation, 723
- Secretary of the general staff, duties of, 151
- Secretary of War, duties of, 3
- Section, battalion medical, 539, 541, 545
- Section battalion veterinary, 541, 574
- Section, regimental veterinary, 542, 549, 573
- Section, squadron medical, 576
- Security
 - analysis of, 110
 - of bivouac areas, 113
 - cavalry in, 60
 - infantry in, 48
 - regimental medical detachment in, 554
- Selective service, history of, 24
- Selective Training and Service Act of 1940, 27
- SEIBERT, EDWARD G., 511
- Sentries, gas, 196
- Serbian barrel, 421
- Sergeant first class, 342
- Service company, 854
- Service record of patients, 819
- Services
 - composition of the, 6
 - duties of chiefs of, 4
- Serving food, 844
- Sexual hygiene, 445, 460
- SHAKESPEARE, EDWARD O., 341
- Shuttle, ambulance, 641
- Shell
 - characteristics of, 65
 - chemical, 327
 - high explosive, 326
- Shelters, gas-proof, 194
- SHIPPEN, WILLIAM, JR., 331, 332
- Shipping ticket, use of, 858
- Shock, first aid for, 499
- Shoe fitting, anatomical study of, 453
- Shot groups, 323
- Shower bath, improvised, 422
- Shrapnel, 64, 326
- Sick call, 804
- Sickness, customs in connection with, 313
- Sick report, 829
- Sick and wounded report, 812
- Signal communication, axis of, 72
- Signal Corps
 - missions of, 113, 116, 125, 127
 - tactical functions of, 70
- Signal officer, duties of, 158
- Signals
 - for scouts and patrols, 91
 - visual, 72
- Signs, conventional, 202
- SILER, JOSEPH F., 364
- Situation maps, 161
- Skin, care of the, 451
- Skull, fractured, first aid for, 499
- Sleep, importance of, 459
- Smallpox, vaccination, 365
- Smoke, chemical, definition of, 182
- Snake bite, 481
- Soakage pit, 405
- Socks, table of sizes, 455
- Sources of venereal diseases, 443
- Spanish windlass, 474
- Special staff, duties of, 154
- Specifications Subdivision, SGO, 375
- Spine, fracture of the, 489
- Splint, application of Army leg, 464
- Sprains, treatment of, 491
- Squad, aid station
 - functions of, 569
 - organization of, 540, 541, 545
- Squad, battery aid
 - functions of, 573
 - organization of, 541, 545
- Squad, company aid
 - functions of, 558, 567, 570
 - organization of, 540
- Squad, infantry rifle, organization of, 38
- Squad, litter bearer
 - function of, 561, 568, 571, 573
 - organization of, 540, 541, 545
- Squad, troop aid, 577
- Squadron aid station, 576
- Squadron, medical, 596, 664
- Squadron surgeon, duties of, 551
- Staff, War Department General, 4
- Staff assistants, 41
- Staff officers
 - classification of, 147
 - definitions and functions of, 147
 - guide for, 149
 - medical, 802
 - organization of, 147
 - relations, 614, 701
- Staff procedure, 147
- Staff records, maps, and reports, 160
- Stage, march, definition of, 106
- STAKMAN, E. C., 512
- Standard, courtesies to the, 305
- Standing operating procedures, 144
- Statement of charges, 858

- Station hospitals, 713, 809
- Stations, regulating, 721
- Statistical and Documents Subdivision, SGO, 376
- Statistical report, 816
- Statistics, vital, 427
- Statistics Subdivision, SGO 374
- Steam sack, 421
- "Stegomyia Brigade", 342
- Stereoscopic relief, 259
- STERNBERG, GEORGE MILLER, 331, 338, 339, 362
- Sternberg General Hospital, 339, 341
- Sternutators, 183, 526
- STIMSON, Miss JULIA, 352
- Stewards, hospital, 340
- Stock record account, 857
- Stock record card, 858
- Stock record of mess, 849
- Storage of foods, 842
- Straddle-back carry, 493
- Straddle trench latrines, 403
- Straggler line, definition of, 170
- Strainer, garbage, 410
- STRAUB, PAUL F., 344
- Strength
 - ROTC, 19
 - National Guard, 5, 10
 - Officers' Reserve Corps, 5
 - Regular Army, 5
- Study in Troop Leading and Management of the Sanitary Service in War, 344*
- Subluxation, treatment of, 491
- Sunstroke, first aid for, 503
- Supplies
 - classification of, 166, 853
 - infantry regiment, 46
 - of large units, 165
 - medical, 727, 863
 - procedure in handling, 658
 - procedure to obtain, 171, 173
 - reserve stockage of, 172
- Supply point, definition of, 169
- Supply sergeant, duties of, 860
- Supply Subdivision, SGO, 375
- Support of the advance guard, 51
- Supporting carry, 493
- Surgical hospitals, 677
- Surgeon
 - army group, 700
 - communications zone, 691
 - duties of, 159
 - embarkation-debarkation camp, 699
 - origin of title for, 334
 - regimental, 551
- Surgeon General, the, 371
- Surgeon General's Office, reorganization of, 356
- Surgeons General of the U. S. Army, 331
- Surgeon's morning report of sick, 815
- Surgical hospital, definition of, 170
- Surveying officer, 862
- SUTHERLAND, CHARLES, 331, 338
- Symbols, special military, 204
- Syphilis, transmission of, 442
- Table of Allowances, 859
- Table of Basic Allowances, 859
- Taboos of the service, 315
- Tabulating and Coding Subdivision, SGO, 374
- Tactical functions of the arms
 - air crops, 78
 - armored force, 83
 - cavalry, 58
 - coast artillery corps, 74
 - engineers, 69
 - field artillery, 61
 - infantry, 37
 - signal corps, 70
- Tactical march, definition of, 105
- Tactical training, 744, 752, 758
- Tank, characteristics of, 85
- Team examining, 806
- Technical training, 743, 751, 758
- Terrain
 - effect on decision, 121
 - influence in tactical operations, 47
 - influence on use of gas, 188
- Terrain features, aerial photographs, 257
- Terrain structure, 229
- Territorial organization of the Army, 7
- Theatre of operations
 - definition of, 167
 - hospitals in, 708
 - laboratories of the, 738
 - medical service within, 689
 - sanitation in the, 735
- Theater of war, definition of, 167
- Thermal injuries, first aid for, 503
- Thermits, 527
- Thigh, fracture of the, 491
- Thomason Act, 20
- THOMPSON, Miss DORA E., 352
- Throat, removal of foreign body from, 507
- Ticks, control of, 437
- TILTON, JAMES, 331, 333, 334
- Time distance, definition of, 106
- Time length of column, definition of, 106
- Title of duty personnel, 811
- Titles
 - of medical officers, 802
 - use of, 311
- TORNEY, GEORGE H., 331, 335
- Tourniquet, use of, 481, 486
- Traction strap, 470
- Traffic control post, definition of, 170
- Traffic patrol, definition of, 170
- Train, definition of, 169
- Triangular bandage, 477
- Training
 - classification of, 743
 - in first aid subjects, 464
 - gas defense, 182
 - guides, 754
 - of medical units, 741
 - plans, programs, and instructions, 748
 - of Reserve officers, 14
- Training Subdivision, SGO, 375
- Trains, unit, 854
- Trajectory, 323
- Transfers to other hospitals, 821
- Transmission of communicable diseases, 431
- Transportation of sick and wounded, 492
- Traumatic surgery, 367
- Travel ration, 841
- Travois, transport of patients by, 497
- Trench, antitank, use of, 143
- Tripler General Hospital, 341
- Troop aid squad, 577
- Troop
 - clearing, 601, 665
 - collecting, 600
 - veterinary, 603, 665
- Troop leading, 171
- Troop movement by motor transport, 104

- "Tropical anemia", 342
- Tropical Disease Board, 342, 353, 356, 364
- TUGO, OSCAR C., 347
- Tugo Hall, 347
- Typhoid Board, Reed-Vaughn-Shakespeare, 361
- Typhoid fever
 - Army investigation of, 360
 - control in Civilian Conservation Corps, 361
- Typhoid Fever Board, 341
- Typhoid vaccine, 343, 345, 383
- Typhus fever, outbreak in Serbia, 352
- Unconsciousness, first aid for, 500
- Uncovering (removal of headdress), 303
- Under arms, definition of, 301
- Unit plan, 781
- Uniform regulations for Reserve officers, 15
- Unit reserves, definition of, 170
- Units of the Army, 6
- Unit training center, definition of, 26
- Unserviceable property, 862
- Urine, disposal of, 405
- Vaccination, compulsory, 365
- Vaccine, production of, 361
- VAUGHN, VICTOR C., 341
- VEDDLER, EDWARD B., 355, 364, 366
- Vehicles, motor
 - convoy movements of, 292
 - field expedients, 294
 - functions of units of, 263
 - lubrication of, 277
 - maintenance of, 280
 - operation of, 284
- Veneral diseases
 - effects of, 461
 - prevention and control of, 440
- Veneral prophylaxis, 343, 345
- Veneral rate, lowering of, 363
- Ventilation of buildings, 434
- Vesicants, 183, 522
- Veterans' Bureau, creation of, 353
- Veterinary administration, 823
- Veterinary aid station, 574
- Veterinary company, separate, 685
- Veterinary Corps
 - appointment and promotion of officers, 378
 - inspection of food products by, 416
 - organization of, 345
 - reorganization of, 356
- Veterinary Division, SGO, 376
- Veterinary hospitals, 696, 811
- Veterinary officers, duties of, 553
- Veterinary Service, 349
- Veterinary service, army, 685
- Veterinary troop, 603, 665
- Vincent's Angina, 451
- Visibility by profile, 231
- Visits of courtesy, 308
- Visual acuity, 510
- Vitality, measures to maintain, 438
- Vital statistics, 427
- Vitamins, description of, 448
- Walter Reed General Hospital, 343, 348, 382
- War, declaration of, 21
- War Department, organization of, 3
- War Department General Staff, duties of, 4
- Ward management, 818
- Ward morning report, 818
- Warning orders, 782
- WARREN, JOSEPH, 359
- Wastes, disposal of, 403
- Water
 - discipline, 394
 - protection against gas, 196
 - purification of, 360, 397
 - yield, 399
- WATSON, JOHN B., 511
- Weapons
 - antiaircraft artillery, 77
 - chemical, 189
 - infantry, 41
- Weather, influence on use of gas, 188
- Weekly training schedule, 755
- Weddings, military, 312
- Weight and health, relation between, 460
- White phosphorus, 527
- WILMER, WILLIAM H., 511, 512
- Withdrawal from action, combined arms in, 133
- "With due respects to Army medicine", 359
- WOOD, LEONARD, 344
- World War
 - battle casualties, A.E.F., 707
 - medical service of the, 350
 - sick rates, A.E.F., 706
- Wounds, types and their treatment, 480
- WRIGHT BROTHERS, 510
- Wrist, fracture of the, 489
- Yellow fever, 360
- Yellow Fever Board, 342
- "Yellow Fever Brigade", 342
- Zones of action, attack, 55
- Zone of the interior, definition of, 167

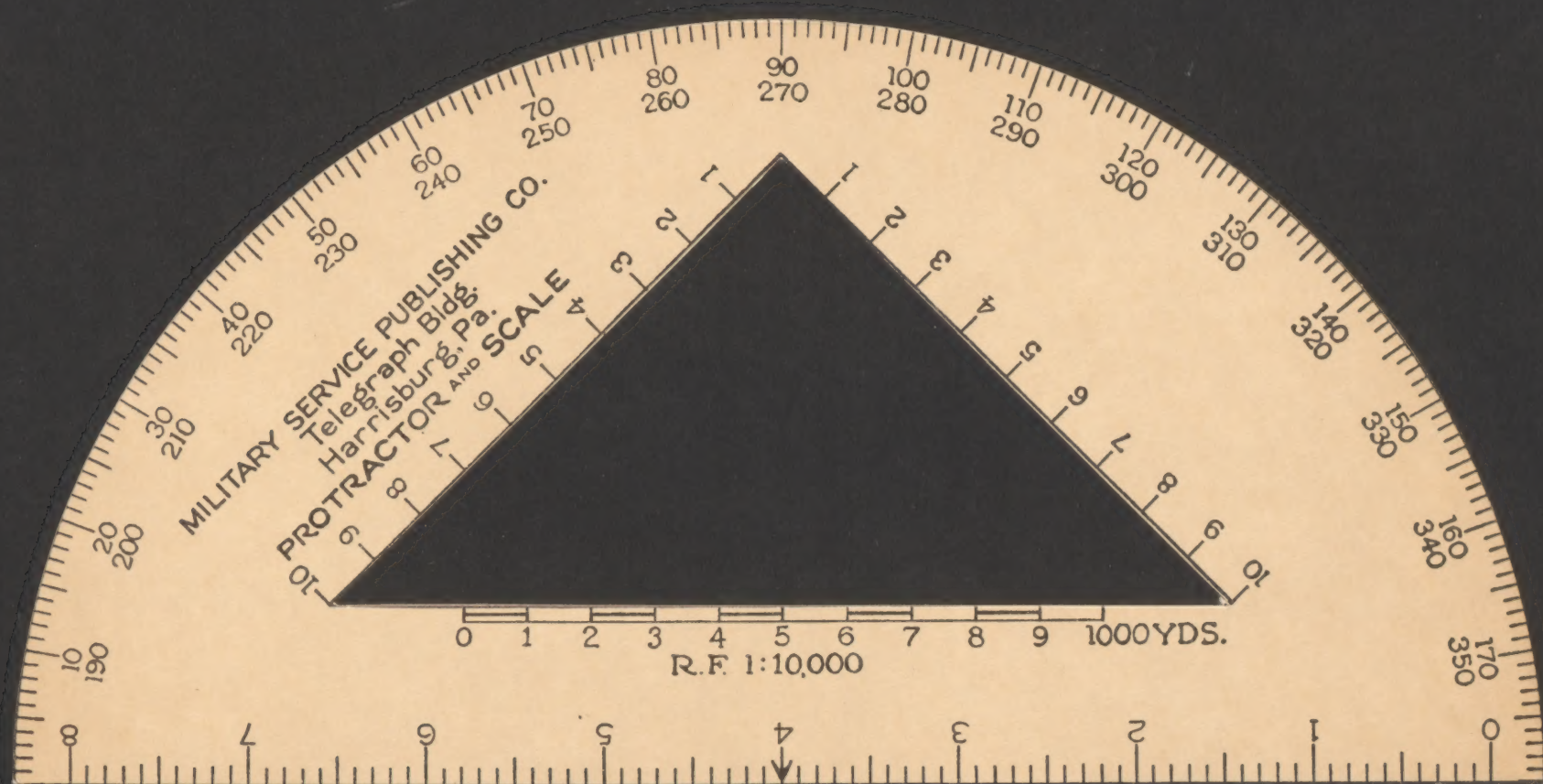
MILITARY SERVICE PUBLISHING CO.
Telegraph Bldg.
Harrisburg, Pa.

PROTRACTOR AND SCALE

0 1 2 3 4 5 6 7 8 9 1000 YDS.

R.F. 1:10,000

7 6 5 4 3 2 1

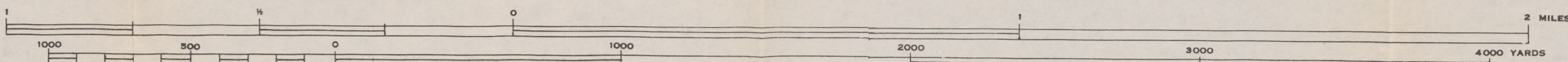


SPECIAL MAP "A"



FOR USE WITH
R.O.T.C. MANUALS OF
THE MILITARY SERVICE PUBLISHING CO.
HARRISBURG, PA.

Scale $\frac{1}{10,000}$



Contour interval 10 feet

Datum is mean sea level

MAGNETIC NORTH
TRUE NORTH
DECLINATION
1935
ANNUAL MAGNETIC
CHANGE 2"
(INCREASE)
GRID DECL. 2°12' E

UH 390 M644 1940a

14131630R



NLM 05100075 3

NATIONAL LIBRARY OF MEDICINE